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The Mechanical Ventilation of the St. Louis Schools

An Engineering Study

By Edwin S. Hallett

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IN view of the fact that the annual meeting of the American Society of Heating and Ventilating Engineers is to be held in St. Louis in January, 1927, it is deemed wise to prepare the visitors for what they may expect to see and to enable them to see what they severally are specially interested in.

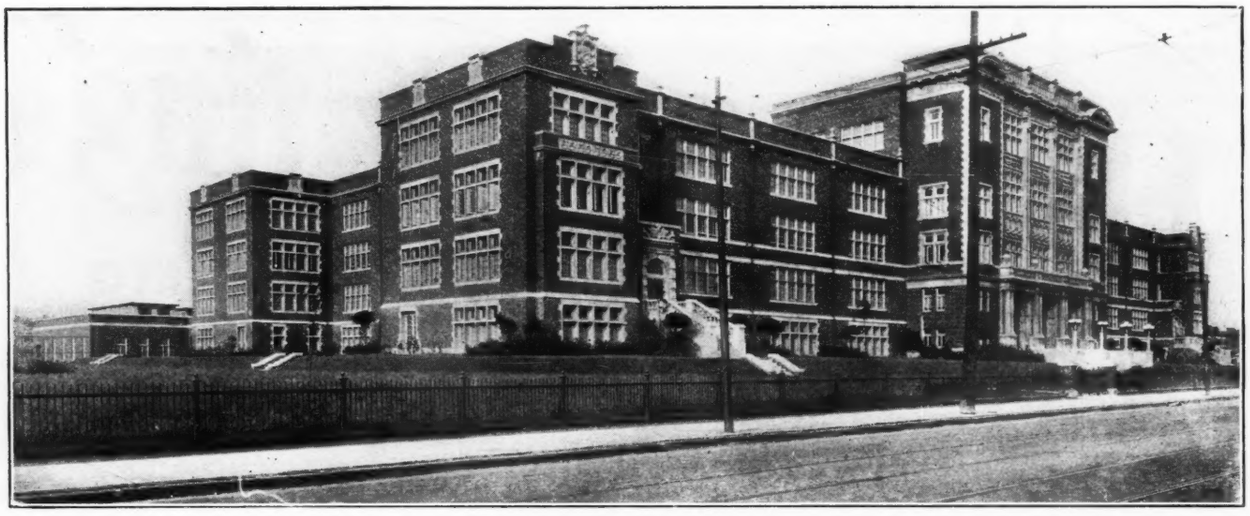
St. Louis has a unique school system. The schools are governed by a special charter from the State giving the School Board all powers of management and having the power of taxing the property independent of the municipal organization. It is a State institution but with wider scope of power than a State university, which must go to the legislature every biennium for all its funds.

Conditions had become intolerable and, while some of the old board members were in the toils of the law, a committee of good citizens went to the legislature for relief and this remarkable charter was the outcome. The present board is not subject to the ordinances of the city.

The Building Department is vested in a commissioner of school buildings and such assistants as he may require. He is in complete charge of all construction, maintenance and operation of all buildings. R. M. Milligan has been the commissioner for the past twelve years and he is architect, as well as commissioner. Mr. Milligan has had wide experience in designing schools. Several years prior to his being chosen architect by this board he was chief draftsman for William B. Ittner, then commissioner of school buildings, and in that capacity had much to do with the design of better schools. For the past twelve years he has designed all the St. Louis school buildings.

The writer has had the privilege during the past ten years to be chief engineer under Mr. Milligan and the new era in ventilation has been the result of this study in a system in which all the phases of the work are gathered into one authority. The occasion for the new development of heating and ventilation is as unique and interesting as the charter itself. It has given the opportunity for efficiency in public office equal to that of the best commercial organization.

St. Louis was a thriving city when the first log hut was built on the site of Chicago. It is an old city. School houses are yet in use that were built before the Civil War. It is a city of cosmopolitan life. A large foreign population prevails and a large colored district is rapidly increasing, making the housing for schools very difficult. Colored schools are housed in separate buildings.



Beaumont School, St. Louis

One of the Buildings Which Will Be Inspected by the Members and Guests of the A.S.H. & V.E. at Their Forthcoming Annual Meeting

THE ventilation of closed buildings lies in the field of science, involving the well-known laws of physics, the less certain laws of biological science, and the most intricate and subtle laws of the human mind. It is not only a scientific problem facing three ways, but it involves the health of all the occupants, which has no measure in dollars, and it affects the efficiency of all workers housed in these buildings, which does have a very clearly-defined monetary value. In teaching a great truth that runs counter to a general misapprehension one must work with patience and recognize the mass inertia of the general human mind.

NATURAL CONDITIONS NOT NECESSARILY BEST

The first fact to be accepted is that the natural conditions in which we find ourselves are not necessarily perfect nor best for our health and comfort. We are to "subdue the earth" and that includes our water supply, food materials and the air for respiration. Twenty-five years ago we recognized the necessity of pure water and it was a short step to find adequate means of procuring it; we must not forget that. The younger students do not appreciate this recent revolutionary step. They have not seen the terrible scourges of typhoid fever and dysentery that prevailed. The dreadful extent of infant mortality up to the same period was cleared up almost instantly upon the passage of laws protecting the milk supply of cities.

This is the first wave of civilization of the world that has had a scientific control that protects the lives of the people against their own poisoning. This is the most significant departure that has differentiated this age from all others that have gone before. This protection has extended to the food and water supplies and has been written into both civil law and into popular approval. Meanwhile, the length of human life has approximately doubled within the period of this generation and has by that fact introduced many new conditions for which there is no precedent. This calls for new thinking and new action.

This task of protection against city and community poisoning, as indicated above, has been but two-thirds completed. In fact it is less than two-thirds completed when the possibility of eradicating the yet unconquered diseases is considered. The air that supplies the oxygen of respiration is yet, in a large measure, in the same raw state that the Mississippi River water was in as used in St. Louis a quarter of a century ago. This difference exists: The muddy water looked bad and it was easy to believe it was bad, whereas the air is at least transparent enough to drive a car through at noonday without lights and horns except on a few very smoky days each year.

But the air is the carrier of every possible pollution and poison that water carried and it is carried unbidden into our bodies through respiration. We do not voluntarily take it as we might the poison of water, but, all unconsciously, we inhale it day and night.

The writer has observed the conditions of a screened sleeping porch which in a single night was overspread with fine visible dust. Had an article of food been spread in the room it would have been covered with so much dust that it would have been thrown out as unfit for food; yet great quantities of this dust, and all else that it carried, were inhaled and mingled with the blood in a far more dangerous way than that taken into the digestive tract.

The writer has repeatedly called attention to the relative respiratory hazard as indicated by the natural reserve of these functions. We have a reserve of food contained in the tissues for a period of possibly forty days, a reserve of fluid supply for not to exceed four days and a reserve of oxygen for not to exceed four minutes. This indicates the extreme sensitive and critical nature of respiration and, naturally, whatever disturbs or injures that process produces a far greater damage to the body than those having large reserves.

DISEASES REMOVABLE BY VENTILATION

At present the diseases immediately caused by air-borne substances (all of which are removable by ventilation) are more destructive than all wars. A large part of every newspaper is filled daily with matters that pertain to war and the appurtenances thereto, yet were this space devoted to constructive information on the eradication of tuberculosis, influenza, and other respiratory diseases that have baffled medical science, that which is worse than war would quickly be eliminated.

NEW SOURCES OF AIR POLLUTION

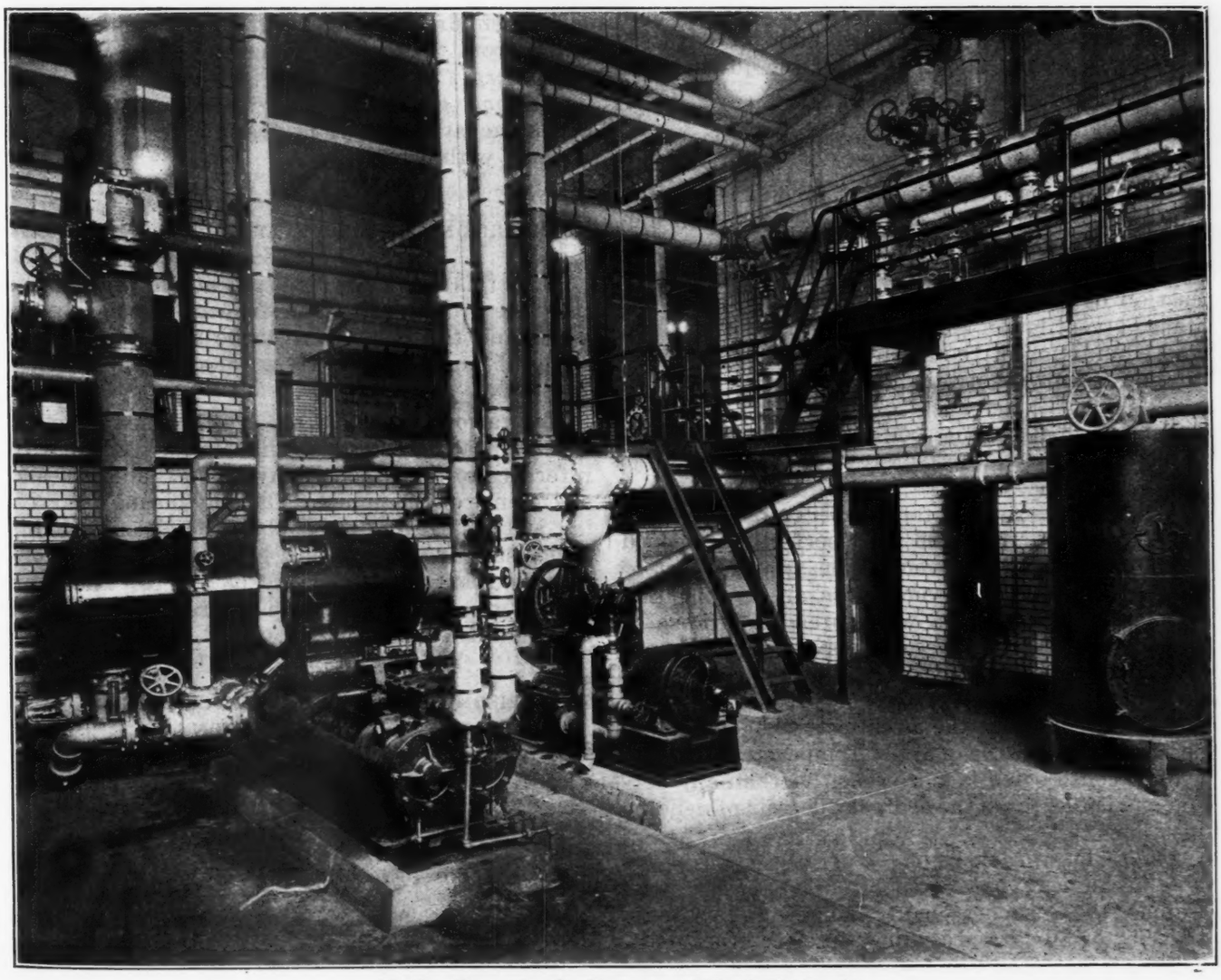
The new source of pollution of the city air is co-incident with the new era of transportation. The automobile exhaust is a very real poison to the human system. Carbon monoxide is a deadly but insidious poison in concentration sufficient to do great injury to persons on the street and in the buildings adjacent thereto. Any amount of CO is injurious and reduces the capacity of the blood to receive oxygen. Any reduction in oxygen from the normal is treated by the physician as anemia; whatever reduces the oxygen carrying power of the blood invites diseases as in such cases the resistance is reduced.

A further increasing source of air poison is the sulphur gas from burning coal. The soft coal used in the St. Louis schools contains 3% to 5% of sulphur. This burns into sulphur dioxide, one of the most deadly poisons known. It is so high in concentration in St. Louis that the great Shaw Botanical Garden is compelled to remove its propagating grounds for delicate plants out forty miles from the city. It should be everywhere published that sulphur dioxide is a more destructive poison to persons than it is to plants.

The directors of Shaw's Garden have the authority to protect their delicate plants which have a monetary value, but who is there to raise a hand in protection of the children from the same source of destruction? Those who observe the struggle for existence of the trees and shrubs of any of our city parks will wonder what is to happen to the children who play about the trees! Black smoke is not the injurious portion, it is the colorless but stinging sulphur that is the corroding poison and smoke consumers will emit just as much of that as the smoking chimney.

BAD ODORS IN CITY AIR

Another source of contamination of the air is the myriad of bad smells. Gases with odors give



Engine Room in the Beaumont School, St. Louis

warning and therefore protection, but it is a safe hazard to say that half the schools of St. Louis are near enough to packing houses, and other bad smelling industries to produce a disagreeable atmosphere about the school grounds. Odors may or may not be injurious to health, but they distract the mind and prevent normal mental activity. They have broken up the normal school activity in many a St. Louis school. At all events, the odors do not properly make a part of a successful school and ventilation is the only means of removing them.

Only one more handicap on the city air can be enumerated here and that is the smoke filter that screens the violet rays of the sun from the earth. Most certainly we know that a mysterious force of sunlight produces growth of plants, sterilizes the flowing streams and produces an amazing benefit to sick people.

The smoke pall (the blacker the worse) screens out perhaps all that ionization produced by the natural violet or ultra-violet rays of the sun. Full ventilation, such as the St. Louis schools have, is the only means of restoring this lost power of the sun to the air of the school rooms.

Not one of this long list of deleterious substances and defects of the city air is trivial or unimportant. All the results can not as yet be traced to a ledger column but it is evident that the health is greatly improved and that is all the justification necessary.

IDEALS FIRST

Before beginning a description of the heating and ventilation of the St. Louis schools it is important to see the motives and ideals that prompted the new study of the subject. The foregoing discussion of the city air content simply raises one item of ventilation function, that is the washing and elimination of the deleterious elements. Ventilation is much more than that.

PROBLEMS OF HEAT CONTROL NOT MECHANICAL, BUT PERSONAL

While the control of the temperature of a room is one of the simplest and most perfectly-developed parts of a mechanical ventilation system, most of the criticisms of such ventilation are against this regulation, indicating a wide-spread ignorance of the operation of this piece of apparatus. It is not the heating system that is to be blamed for the room being too warm or too cold; it is the man in charge or possibly the architect who wrote the specification for the plant. Temperature control as now constructed is more sensitive than any person and is free from the ordinary defects of delicate instruments.

The serious problems of temperature control are not mechanical, but personal. The teacher who watches the thermometer in her home and observes that 75° or 80° are necessary to her comfort naturally can not easily be convinced that 65° or 68° are comfortable to any one.

The writer carried out some experiments in the Mullanphy School in which the humidity control was raised and maintained at 55% to 60% of relative humidity and put an indicating hygrometer on Dr. Shackelford's desk. The thermostats were then set at 64° to 65° in the class rooms. Not long after this change a teacher came to the principal with the information that her room was cold. Said he, "Are you cold?" "No, but the thermometer reads 65° and that is cold." "Have the children complained?" "No, they have not, but that is too cold." "Well, Miss A, we have a fine lesson here. The chief engineer asked me to carry out an experiment in the use of lower temperature and higher humidity. You say the room is comfortable to all at 65°. That is because the relative humidity has been raised and this condition is far more healthful than the old way."

In schools that have air washers or other means of humidity control, the thermostats should be set at about 68°. This pre-supposes the proper air velocity in the class room. This will receive attention in a later paragraph.

What are the peculiar qualities of the air in those delightful places on the earth such as the Bermuda Islands, or Catalina Island? What would be the reaction of a community upon the proposal to house all the children in a delightful atmosphere duplicated from these pleasure islands? A chorus of voices cry, "Is it possible?" Yes, it is possible. The science of heating and ventilation has reached the stage at which it is possible and easily and cheaply within reach.

COMPARISON OF VARIOUS TYPES OF VENTILATION

With this bit of idealism put at the head of the page the program has gone forward for nearly ten years and the results are to be set down in this series of papers in THE HEATING AND VENTILATING MAGAZINE.

The various groups of schools classified as to the type of heating equipment have been studied with reference to the effect, if any, upon the health and attendance of the pupils. The only means of arriving at the health is to tabulate the absence. This is not strictly accurate but health is the only constant element in attendance data. No table can have a greater value nor be of greater interest to the engineer and architect.

COMPARISON OF ATTENDANCE IN CLASS GROUP AND COAL CONSUMPTION

	Aver. Attend. in Percent of Enrol.	Yearly Cost of fuel per pupil
15 schools, direct radiation.....	83	$0.73
21 schools, fan, but no washer.....	88	0.74
35 schools, fan and air washers....	90	0.82
5 recent recirculating complete air conditioning	93	0.37
3 high schools built prior to 1920	93	not obtainable
Roosevelt High	94	0.37

(Continued on Page 69)

The Installation of Domestic Oil Burners

An Analysis, From a Nation-Wide Point of View, of the Intricate Problems Facing Insurance and Safety Boards

By E. J. Smith
Engineer, Underwriters' Laboratories.

Reprinted, through the courtesy of the National Fire Protection Association, from the "Quarterly" for October.

THE proper installation of a domestic oil burner is vitally important and so many questions have been raised with regard to interpretation of the Regulations of the National Board of Fire Underwriters for the Installation of Domestic Oil Burning Equipments as recommended by the National Fire Protection Association—1925 Edition, that the writer is attempting briefly to give his own answers to some of the points in question and to give an outline of what to do and what not to do when making an oil burner installation.

SELDOM is a so-called "desk man" qualified to write on subjects pertaining specifically to work in the field.

But E. J. Smith, an executive engineer directly in charge of the oil-burner phase of the Underwriters' work, is peculiarly qualified to disprove the rule.

An engineer by training, a keen observer of all things that happen before his eyes, an enthusiastic advocate and helper of every manufacturer who is striving to produce a safe and fool-proof mechanism, "E. J." enjoys the confidence and good fellowship of his associates in the laboratory, in the oil-burner industry and among those engaged in eliminating fire risks and in fighting fires.

Every burner that has been offered to the Laboratories for test has been "installed" in one of the many boilers or furnaces in the laboratory. Many of these have been installed several times, and few have acquired a "listing" without some changes for the better.

Much of this "installation" work, by the best engineers of the various manufacturers, has been done before his eyes. All has been observed by his assistants, and their reports have passed over his desk.

In view of which, E. J. Smith is undoubtedly able to discuss the problems of oil-burner installation in a more catholic manner, than any one in the industry, having in mind local conditions in all parts of the country, and visualizing the composite installation of burners of many types and makes rather than one particular burner.

No doubt we all agree, in a measure at least, with the preface which states that the safest type of oil burning system for domestic use is one in which all piping and the tops of the tanks connected therewith are located below the level of the base of the burner, but when we continue and say that this ideal oil burning system is one in which the supply of oil to the burner is so controlled that there may be no reason to expect the possibility of a continuous discharge of oil into the building in case of pipe breakage or ignition failure, we find ready room for argument.

Some will say if the tank is located with its top below the level of the burner and if we use a burner equipped with a pump which discharges fuel only when there is a demand for heat, we have the ideal installation. Perhaps they are right, but since we know that in order to secure necessary flexibility of operation we must have an excess pump capacity, there is always a greater or less amount of oil being circulated in the system while the burner is in operation and this oil is just as ready to escape in case of pipe breakage as is the oil in a gravity system or in a pressure system.

It is hard to understand wherein greater immunity from breakage may be assumed for the return line of a pump system than for the supply line of a gravity system, but such must be the case if we are to say that the pump equipped burner is, without any qualification, safer than a gravity feed system.

It is undoubtedly true that a gravity feed system may be so installed as to be safer than a pump type system, but let us hasten to say that the reverse may be just as true. In other words, there may not be that vast difference between a gravity feed system and other types of oil feed as some would lead us to believe.

Frankly, in the writer's opinion, the principal concern is not the type of oil feed but the principles involved in the construction of the oil burner and the thoroughness with which the installation regulations are complied with. It is not intended at this time to discuss the various features of standard types of burners, but it may not be amiss to point out that the more or less common practice of distinguishing between the two general types of domestic oil burners by the use of the terms "power burners" and "gravity burners," is very

misleading. Oil may be supplied to either type by gravity or power and for this reason why not designate the one that requires no mechanical means for creating a draft, a natural draft burner, and its contemporary, a mechanical draft burner?

THREE TYPICAL TYPES OF INSTALLATION

It is difficult in a short article such as this to cover all possible phases of domestic oil burning installations. For this reason illustrations Figs. 1, 2 and 3 will show typical features of only three of the most common forms of installations.

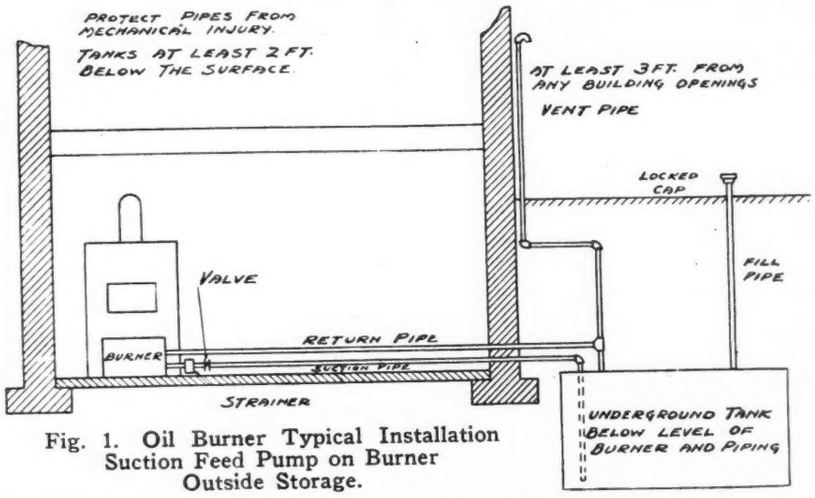


Fig. 1. Oil Burner Typical Installation Suction Feed Pump on Burner Outside Storage.

Fig. 1 shows the proper relation of the various parts in the installation of a standard oil burner of a type in which the pump is an integral part of the burner. Fig. 2 indicates a common form of installation with a burner of the type in which the oil is supplied by gravity to the burner. Fig. 3 is similar to Fig. 2 but in place of the familiar 60 gal. gravity tank we have a standard type of automatic power pump. Numerous modifications of these typical installations are being made and likewise other methods of transferring fuel from supply tanks to oil burners are frequently encountered.

One of the most frequent questions relates to what may be done properly to safeguard an installation, where, on account of local conditions, it is impossible or impractical to install the outside storage tank so that its top will be below the level of the lowest pipe in the building. It will be obvious by reference to either Figs. 1, 2, or 3, that if the underground storage tank is installed at a point higher than the various pipes leading into the building, we will have a condition where, in the case of breakage of the pipe at a low point, there will be a possibility of the entire contents being discharged into the building by siphoning. Rule 1 (a)[1] on the location of storage tanks states that in such cases adequate provision to prevent siphoning shall be provided, and in a note makes a general reference to some methods that have been employed and that have been accepted in some territories.

DEVELOPMENTS IN OIL BURNER INDUSTRY SET PACE FOR RULE-MAKERS

The question is frequently asked whether the suggested methods are adequate for all conditions, and whether any one of the methods briefly described will be accepted in all territories. It is to be noted that the note merely states that certain methods may be acceptable, and furthermore points out that such acceptance is dependent upon the specific approval of the inspection department having jurisdiction. As a matter of fact, the methods described in the note are not intended to be other than suggestions, and were placed in the rules at a time when the so-called anti-siphoning devices were not so well known as at present. There are at present devices on the market, some of them listed by Underwriters' Laboratories, which are far superior to probably most of the expedients in the note mentioned.

The note suggests the use of a fusible plug located at the topmost point of the pipe lines, the purpose of which is to melt in the case of a fire, and thus allow the oil in the pipes to drain back to the underground storage tank. This arrangement undoubtedly has some value, but naturally, if the breakage has occurred before the fire, the contents of the tank may be drained into the building before the fusible plug has melted. Weighted foot valves likewise will serve to prevent siphoning, but in case of leakage of the valve through an imperfect seat on account of foreign material lodged on the seat, they would, in such cases, only be partially effective in case of breakage of the pipe. Enlarged pipe sections on the discharge side of the siphon will, if properly proportioned with respect to the height of the tank above the burner and the capacity of the burner pump, effectually prevent siphoning, but since this arrangement to be effective must be properly proportioned to fit the case, it is obvious that the only way in which its effectiveness may be determined will be to conduct a suitable test on each and every installation, as made.

Air inlets at the top of vents controlled by pump pressure also have been used, but many of these are more or less delicate, and likewise may be open to the criticism that their use may make it difficult to pick up the suction when the oil burner pump is not of sufficient capacity promptly to supply oil when first starting.

OIL RETURN-LINE TO STORAGE TANK MUST BE CONSIDERED

It is also to be noted that even though arrangements are made to prevent siphoning through the suction line, in case of breakage, many of the expedients followed will not in any manner prevent the continuous discharge of oil from the return line in case of its breakage, and accordingly, the only safeguard against the discharge of oil lies in the strength of the pipe, which normally is one

size larger than the suction line. Of course increasing the size of this pipe will reduce the possibility of breakage, but nevertheless, as there are at present devices on the market designed to be installed in the suction and return line at a point above the level of the top of the tank, and which in case of breakage of either of the pipes will prevent the discharge of oil into the building, full consideration should be given to the desirability of encouraging their use.

In Fig. 3, it is to be noted that in case the underground storage tank is located above the level of the oil burner, the installation of the automatic pump above the level of the top of the tank, and the carrying of all pipes between the pump and the tank through the building wall and to the pump in such a manner as to keep them always above the top of the tank, provides an effective means for preventing siphoning, and in the case of those pumps equipped with an automatic shut-off, designed to cut off the power supply to the pump in case of an abnormal discharge caused by a break in the supply line between the burner and the pump, we have a definite limit to the amount of oil that may be discharged into the building in case of a pipe breakage.

PROPER VENTING NEEDS STUDY

A means for venting of tanks is also one which, while covered in a general way by Rule 3[2], is frequently not understood. We find tanks located in the building with the vent openings not connected by piping to the outside of the building, and we find the tank vent openings bushed down, and pipes even as small as ⅜ in. carried to the outside of the building for venting purposes. A vent as small as this obviously is sufficient to prevent the creation of a vacuum when drawing the oil from the tank to the burner, but it is not sufficient to take care of more extreme conditions such as will be encountered when filling the tank rapidly or in the case of a fire.

All tanks located inside of a building should have vent pipes carried untrapped to the outside of the building with pipes of the same size as the vent connection on the tank. If tanks are of larger capacity than 10 or 15 gal., these vent pipes should be of at least 1 in. standard iron pipe size. In those cases where the main storage tank consists of a reservoir of a capacity of around 200 gals., and from which the oil is transferred from this storage tank to the gravity tank by means of a hand pump, both the gravity tank and the storage tank may be connected to the same vent, and the piping extended through the wall to the outside of the building. All vents should be arranged so that there will be no possibility of traps which will serve to collect any obstruction to the free flow of vapor or air.

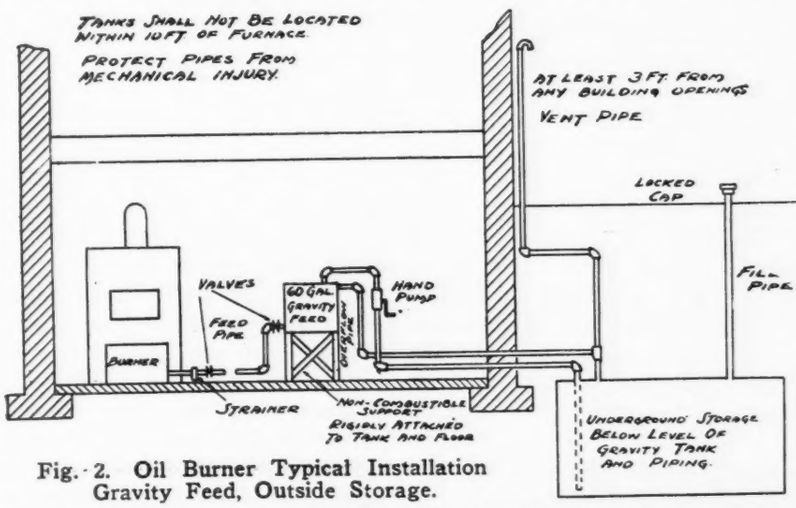

TANKS SHALL NOT BE LOCATED WITHIN 10 FT. OF FURNACE.
PROTECT PIPES FROM MECHANICAL INJURY.
AT LEAST 3 FT. FROM ANY BUILDING OPENINGS
VENT PIPE
LOCKED CAP
FILL PIPE
VALVES
60 GAL. GRAVITY FEED
HAND PUMP
FEED PIPE
BURNER
STRAINER
NON-COMBUSTIBLE SUPPORT RIGIDLY ATTACHED TO TANK AND FLOOR
UNDERGROUND STORAGE BELOW LEVEL OF GRAVITY TANK AND PIPING.

Fig. 2. Oil Burner Typical Installation Gravity Feed, Outside Storage.

Gauges for use in tanks inside of the building frequently are of a type which introduces an opening that may be classed as a vent opening, and although generally of small size, such openings are subject to practically the same objection as would be the case if the regular vent opening were not piped to the outside as previously mentioned.

PROBLEMS INTRODUCED BY PUMPING OIL FROM TRUCKS

In the case of vents for underground storage tanks, it is to be noted that although Rule 3 (c) states that the vent pipe shall be of ample size to prevent abnormal pressure in case of filling, the minimum of 1 in., as mentioned, is all too frequently considered as being ample for all conditions. As a matter of fact, in the majority of installations, the present day practices are such that this 1 in. vent is ample. However, where heavy oils are used, the oil dealer is now usually found to be delivering the oil from the tank wagon by means of a power pump through a hose tightly connected to the fill opening of the underground storage tank.

The purpose of this method of delivery is to cut down the time of filling the underground tank and enabling the tank wagon driver to supply a larger number of customers within a given time. In such cases, a vent pipe larger than 1 in. undoubtedly should be used. The exact size to be employed naturally is dependent upon the rate of delivery from the power pump on the tank wagon. The danger encountered with this combination of rapid filling and small vent occurs particularly where the driver underestimates the available capacity of the underground storage tank. This results in the underground tank being subjected to considerable pressure when the oil level reaches the top of the tank and the liquid attempts to escape through the small vent.

A considerable number of tanks have been ruined and the oil lost, in some cases finding its way into buildings, where this method of filling has been employed. It is of course obvious that if the vent pipe is of ample size damage to the tank will be avoided, but where overfilling occurs, the result will be that oil will be discharged from the vent line with a resulting condition more or less hazardous, depending, of course, upon the location of the

vent pipe terminal. If this terminal is carried up the side the building, it is obvious that any considerable amount of oil escaping may be sprayed over the side of the structure, or, as actually happened where the vent had been located above a roof, oil may be poured on to the roof of a building and carried away through the gutters and down spouts.

It has been more or less jokingly suggested that if such methods of filling are to become a practice, it might be well to insist that the vent pipe terminal be so located that the discharge of oil will be quickly evident to the operator; in other words, so arranged that it will be pointed directly at the man making the oil delivery. Fortunately in most cases, as before stated, oil is delivered to small domestic installations by gravity, and a 1 in. vent is ample, as the underground storage tank is not subjected to pressures in excess of that caused by the height of the oil in the tank.

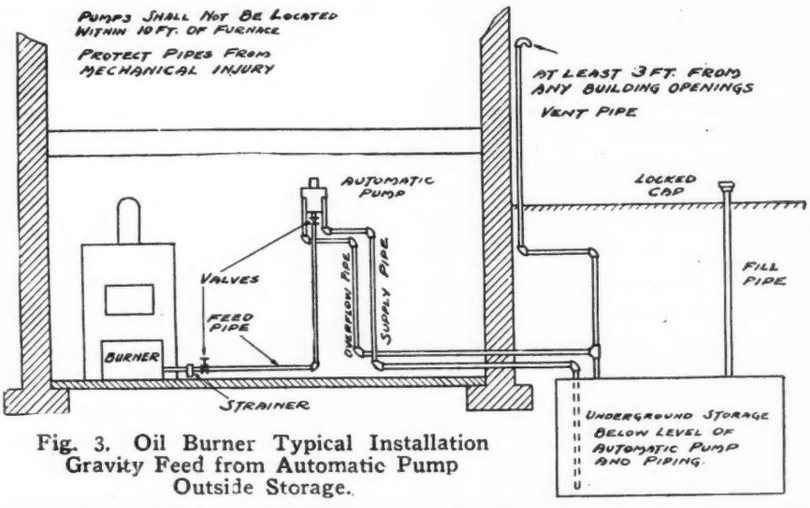


Fig. 3. Oil Burner Typical Installation Gravity Feed from Automatic Pump Outside Storage.

HAZARDS RESULT FROM FILLING TANKS IMPROPERLY INSTALLED

In spite of the fact that Rule 4 specifies that all filling pipes terminate outside of buildings, we frequently find a desire on the part of installers and home owners to locate the inside storage tank close to a window opening, and to expect the tank wagon man to place the faucet hose through the window and insert it in the fill opening of the tank. This naturally results in the discharge of more or less vapors into the basement, and in the case of overfilling, certainly introduces a hazard that may be avoided by strictly following Rule 4. All filling operations for oil burner tanks, where the filling is the initial delivery of oil by the oil man, should be carried on outside of the building, and the fill openings should be so located as to prevent the possibility of flow of oil or vapor through basement doors or windows.

METHOD OF FILLING AUXILIARY TANKS

Where auxiliary tanks, such as shown in Fig. 2, are installed, the general method of filling is as indicated by the illustration. This method of installation is covered by rule 9, and 10 (a),[3] but when the so-called auxiliary tank is used as the principal storage, as is sometimes the case in very small installations, and as hereafter will probably be more frequently encountered on account of the increase in the gravity tank capacity from 60 gal. to 275 gal., as per action taken at the last annual meeting of the National Fire Protection Association, then it becomes necessary for the installer to observe Rule 4.

The installation of a standard type of pump in the pipe line, as shown by Fig. 2, is one which is sometimes carelessly done, in that the pump is merely attached to the piping and not secured in any manner to the wall or floor of the building. All standard pumps listed by Underwriters' Laboratories for this particular purpose are provided with bases or other means for rigidly attaching them to the wall or floor of the building. This particular feature is not shown by Fig. 2, as the drawing of the pump in question is more or less conventional in form, and not in sufficient detail to indicate the wall attachment.

It should not be necessary, in discussing the typical installation shown by Fig. 2, to point out the need for running an overflow line from the auxiliary tank to the underground storage tank. Strange as it may seem, many installations have been made in which no overflow line is provided, as well as omitting the necessary vent pipe, and in such cases the operator may, and frequently does, overfill the auxiliary tank. The writer has personally seen a number of instances in which the basement floor around the auxiliary tank was well soaked with oil.

WHAT IS THE BEST METHOD OF GAUGING STORAGE TANKS?

After discussing the venting and filling of tanks, the next step brings us to the question of gauging or otherwise determining the quantity of oil in any of the storage tanks. The most common practice in this connection is the use of the fill opening for the insertion of a gauging stick. Obviously when the underground storage tank is located under a building, as is often necessary, it is impossible to introduce a gauging stick through the fill opening, and in such cases it is very common practice to make use of what is termed the "test well."

Practically speaking, this is a second pipe similar to the fill pipe shown on Figs. 1, 2, and 3, but since when the tank is in the building the cap of this pipe is inside, it is obvious that when it is open we have a direct opening from the storage tank into the building. Any forgetfulness on the part of the user of the test well, resulting in leaving the cap off, naturally permits a direct passage of vapors into the building when filling the tank, and likewise introduces the possibility of the dis-

charge of oil into the building if the tank should be overfilled.

In the writer's opinion, the use of test wells is less excusable at the present day than it has been in the past. There is now on the market and included in the listed devices standard gauging equipment of sufficient accuracy, which serves practically every purpose of the test well and which eliminates the possibility of discharge of oil or vapor into the building under any normal condition of filling. Gauging devices of this type enable the owner to determine the amount of oil remaining in the tank, permitting him to gauge the quantity of oil delivered, and if properly observed by the delivery man materially reduce the possibility of overfilling a tank. The devices referred to do not involve the use of glass, the breakage of which will permit the discharge of oil or vapor into the building.

Consideration may well be given at the present time to the desirability of either eliminating the old-fashioned "test well" or limiting its use to the necessary emptying of the tank when, as sometimes happens, water is delivered with the oil, or oil of an improper grade has been placed in the tank and must be removed. The use of such a device for removing liquid would be confined to such tanks as are located under buildings, and instead of installing the device as a test well it could be a second suction line with the pipe extending very close to the bottom of the tank instead of several inches above the bottom of the tank, as is generally the case with the suction pipe connected with the oil burner.

HOW PROPERLY TO INSTALL TANKS

In the setting of tanks, buried underground, outside, or under the building, or installed inside of the building, the most frequent cause of trouble is in the character of tank foundations. Rule 7 very clearly states that tanks shall be set on a firm foundation, but all too frequently we find that instead of a smooth level surface for the tank, the installer leaves the excavation with depressions and rocks at such points where contact is made with the tank surface in such a manner as to create undesirable strains.

In making an excavation for a tank, the bottom of the hole should be smoothed off, and where rock and gravel are present, any inequalities should be eliminated by a slight fill of well tamped sand or earth. Where the character of the soil or other surface on which the tank is to be placed is such that some form of foundation is necessary, special tank supports must be prepared. These supports must be properly placed in order to prevent undue stresses on the tank.

In this article no attempt will be made to suggest any particular means for determining the proper amount, but obviously, in the case of a long tank, it should not be assumed that a brick or concrete saddle at each end will be sufficient. In such an installation we have the mechanics of a beam uniformly loaded, and supported at each end. Such an installation may very readily result in injury to the tank, the loss of oil, and in causing a serious fire hazard. It would be far better to have several saddles located not more than two or three feet apart, thus uniformly distributing the supports throughout the length of the tank, and avoiding unnecessary stresses in the structure.

RUST MUST BE GUARDED AGAINST

It is also well to point out at this time that when burying underground storage tanks, Rule 2 (c), which calls for coating the outside of tanks with asphaltum or other rust resisting material, should be carefully observed. The asphaltic or other paint coating applied to the tank by the manufacturer, is of principal service in keeping the tank in good condition up until the time when it is ready for installation.

It is obvious that any tank coating applied at the factory must be more or less injured due to rough handling in transportation and installation. Every underground tank, whether made of galvanized metal or plain steel, and irrespective of the apparently good condition of the coating applied by the tank manufacturer, should be thoroughly coated on the outside with tar, asphaltum, or other suitable rust-resisting material. It may also be said that in some locations, such as for example where a tank is installed in filled ground, the corrosive condition of the soil may be such as to warrant further protection. Probably the best suggestion to make in such a case would be the use of an ample coating, consisting of a rich mixture of Portland cement and sand.

TANKS CAN BE DAMAGED BY CARELESS HANDLING

When installing tanks, installation men all too frequently are of the opinion that the tank may be rolled over and dropped into the excavation. Numerous instances have been cited where tanks

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The Mechanical Ventilation of the St. Louis Schools

(Continued from Page 64)

The distribution of the schools of the various groups is fairly uniform. Some of each group are found in all parts of the city, except in the new additions. Everything has been done for the old schools to bring them up to modern conditions and they are much better than formerly.

It will be noted that the percentage of attendance rises steadily as the type of heating and ventilation improves. The cost of fuel rises slowly until the new schools are reached, when it drops to half. This group method of taking all the schools of the same class precludes the possibility of selecting special test schools. The accompanying table was compiled from the official reports to the board.

(To be continued)

so handled have been seriously injured. The only excuse for such a procedure is the saving of time, and this saving is never such as to warrant the practice. Unfortunately, perhaps, tanks are generally so well constructed that the installer's experience has not caused him to fear the possible results.

Tank manufacturers have cited instances of two and three thousand gallon tanks being dropped into holes 10 and 12 ft. deep, the bottoms of which were covered with rock and gravel. Those responsible for tank installation should strictly caution installation men to carefully lower the tank in place, and in case of unavoidable accident, to subject any suspected tank to a pressure test before covering it up. The manufacturer of the tank or his representative should be consulted as to necessary test procedure.

According to Rule 7 (d), inside storage, gravity and auxiliary pressure tanks shall be provided with incombustible supports securely attached to the tank and to the building structure. This, of course, applies principally to tanks of not over 275 gal. capacity, such as are permitted by Rule 1 (b). The need for securing such inside tanks, as specified by the rules, was clearly illustrated in a recent fire in one of our Eastern cities where a gravity tank not properly secured to its support and bolted to the basement floor was floated from its support, the pipes broken, and oil discharged on the surface of the water. If this tank had been installed strictly according to Rule 7 (d), and otherwise conformed to the regulations regarding piping and venting, the oil would have remained in the tank, irrespective of the amount of water in the basement.

NEW RULING PERMITS 275-GAL. GRAVITY INSIDE TANK

Rule 8 of the regulations, which applies to gravity and pressure tanks, is one which has been frequently questioned. The most frequent question with regard to Rule 8 (a) has been how to determine the capacity necessary for a one day supply. This particular rule has been altered by the previously mentioned action of the Association at its last meeting, and the limit for such gravity tanks will now be 275 gal., irrespective of the daily consumption. Any need, therefore, to discuss the difficulties of determining a one-day supply is avoided.

Rule 8 (b) requires a gravity tank to be 5 ft. from any fire or flame, and requires a pressure tank to be 10 ft. away. The writer believes that both types of tanks should be installed at least 10 ft. measured horizontally from the furnace, or from any fire or flame.

AUTOMATIC FUEL SUPPLY PUMPS MUST HAVE CERTAIN CHARACTERISTICS

The use of automatic pumps which are not an integral part of the oil burner has been becoming more common. These devices serve as a ready means for avoiding the use of inside tanks. Their principal appeal to the owner of the oil burner equipment is the practically constant supply of fuel without the need for any attention on his part. Their use, of course, reduces the necessary presence of the householder at the frequent intervals which would be required where an auxiliary tank of limited capacity must be filled each day. Just how much is lost or gained by this additional automatic feature is more or less a matter of opinion, as there are probably no data available for comparative purposes.

It is also obvious that if an automatic device is employed it always will be ready to supply oil, irrespective of whether the demand is from the oil burner through the proper channels or through the breakage of a pipe connection. For this reason, Rule 10 (b) states that such pumps shall preferably be provided with automatic means for preventing the continuous discharge of oil in case of pipe breakage.

CARE NECESSARY IN INSTALLING AUTOMATIC PUMPS

Automatic pumps now listed by Underwriters' Laboratories are provided with this automatic feature, and are designed to limit the amount of oil which may be discharged into the building in case of the breakage of the pipe to an amount considerably under that which might escape in the case of the breakage of a pipe connected to the ordinary gravity tank. To secure this desirable condition, it is necessary that such automatic pumps be installed strictly in accordance with the manufacturer's directions. The size of the piping to be used, and the lengths as well, should not be varied in order to meet any special installation conditions. Such variations may very readily result in nullifying the automatic shut-off feature.

It may also be noted that where the automatic pump is installed in connection with a tank, the top of which is above the lowest pipe used in connection with the oil burner, the pump if installed above the level of the top of the tank will serve as an anti-siphoning device. In such cases it is strictly necessary to install both the suction line and the overflow line from the automatic pump to the tank in such a manner that the pipes are all located above the top of the tank and so secured that in case of any breakage there will be no opportunity for the pipe to drop below the level of the oil in the outside storage tank, and thus introduce the possibility of siphoning.

SOME SUGGESTIONS FOR PIPING BURNERS

So much has been said with regard to the proper piping of oil burner installations that it really should not be necessary to add much more at this point. However, it is always safe to speak of the desirability of making all pipe joints tight, as there is probably nothing more objectionable than an unsightly oil stain at each and every oil joint, such as has been all too common in the past.

Rule 11, on the subject of piping, clearly indi-

cates that the piping should be carefully protected against mechanical injury in a manner satisfactory to the inspection department having jurisdiction. Unfortunately it is not always possible for the inspection department to check up on this point, and we find piping running over the floor and exposed in a manner which, given time, ultimately will result in damage and leakage of oil.

Where it is absolutely necessary to run a pipe across a floor a very substantial guard should be placed over the piping, and this guard should be rigidly secured to the floor. Piping should be run in corners between the side wall and the floor, and in such cases it may not be necessary to provide any extra protection, but even so, proper guards would not come amiss. Many manufacturers are instructing their installers to run the piping under the floor. This arrangement is ideal in so far as the question of damage and breakage is concerned, but it of course makes it rather difficult to clear the piping of any water or dirt which may accidentally come into it.

FLEXIBLE TUBING MAY BE DEVELOPED TO MEET RIGID REQUIREMENTS

Rule 11 (a) states that in all piping systems, proper allowance should be made for expansion and contraction, jarring, and vibration, and in the case of some burners, this brings up a point which has been rather difficult to solve, and which, in fact, has until very recently had no definite and recognized solution. The last sentence in Rule 11 (a) prohibits the use of tubing of any kind, which prohibition was based, at the time the rules were drawn, on the prevalence of light wall seamless tubing, and on very delicate, easily injured flexible tubing or hose.

Underwriters' Laboratories' List at the present time contains reference to flexible tubing which has been found to withstand very severe service when employed in a very definite and prescribed manner. Tubing of this class, and there will probably be a number of manufacturers prepared to supply it within a short time, serves a very useful purpose in cutting down the transmission of undesirable vibration, which is sometimes encountered in the case of motor operated burners. The material is not to be considered as a substitute for standard full weight iron pipe or brass pipe of equal strength but, when permitted by local authorities, will serve a very useful purpose, and as before stated, if properly installed, may be expected to have a tendency to reduce the possibility of injury to the piping by vibration, to say nothing of eliminating or minimizing the transmission of undesirable sound. It is to be expected that proper consideration will be given to the revision of the rules to recognize material of this kind when properly installed.

STANDARD VALVES SOLVE MANY MINOR TROUBLES

Rule 12,[4] relating to valves, needs little explanation, but as we so frequently find the use of valves which are not provided with a standard form of stuffing boxes, it may be well to point out that where a stuffing box is not of liberal size, and is not provided with a removable cupped gland, we frequently find that the user has difficulty in making the packing box tight, and often when replacing the packing, inadvertently allows a few strands of the packing material to get between the threads of the packing nut and the corresponding threads on the body of the valve, and when tightened up, gives an impression that the packing box is tight, whereas the fact is, the packing is compressed a very little, and probably will leak. Standard types of valves are more readily obtained on the market today than formerly.

It has often been the case in years past that the manufacturers of oil burners have said that it was impossible to get small valves of the size used on oil burners without giving a special order. Standard types of valves are now obtainable from a considerable number of manufacturers, and there is really no excuse for the use of an improper valve in an oil burner installation.

AVOIDABLE RISKS FREQUENTLY THE FAULT OF THE OWNER

Rule 16 (a) states that the ash door of the furnace shall be permanently removed, or else bottom ventilation provided to prevent the accumulation of vapors within the ash pit unless burner is of a type which mechanically purges the ash pit. We frequently find that in the case of some types of burners where there is no reason for expecting that the operation of the device will purge the ash pit, the front opening is completely plugged up by fire brick and cement.

With some types of burners it is necessary to reduce the amount of air flowing through the air door opening, but especially in the case of natural draft burners, this opening should not be completely blocked, and a definite opening, as close as possible to the floor level, should be provided. This rule also recommends that when the ash door is closed, other doors of the furnace should be arranged to swing from the top, or some other means provided to relieve pressure sometimes caused by puffs or back fire due to delayed ignition. This particular rule has caused some comment, and in the case of competitive arguments, it has been pointed out that this indicates a hazardous condition found alone in oil burners. Speaking directly from actual experience, the writer has had more severe puffs or back fires when handling coal fires than ever experienced when handling properly designed and installed oil burners.

CARELESS INSTALLATIONS MAY CAUSE SO-CALLED EXPLOSIONS

It is quite true that there has been some rather severe so-called explosions of oil-fired furnaces, but in practically all of the instances investigated, these have been due either to faulty installation or to a householder making adjustments contrary to the manufacturer's operating instructions. Dampers in pipes or at any point in the furnace either should be removed, or if for any reason it is felt necessary to have some control on the draft,

a section should be cut out of the damper so that irrespective of the damper setting, it will not be possible for more than 80% of the internal cross-sectional area of the smoke passage to be shut off.

In the case of a recent report of severe smoke damage, said to be caused by improper operation of the domestic oil burner, it was found that the installer had not followed the rule [16 (c)], but had to his own satisfaction secured an equivalent. This was done by wiring the handle of the damper in such a manner as to prevent it being closed. Unfortunately it happened that when the householder felt it was desirable to clean the smoke pipe, the wiring was removed, and when piping was replaced, the damper accidentally was completely closed. As a result of this, the burner when started up, continued to pour products of combustion into the furnace, and the only egress was through the front of the heater.

FINAL TEMPERATURE OR PRESSURE CONTROL SHOULD REQUIRE MANUAL RESETTING

Rule 16 (e), which it will be noted is a recommendation rather than a specific requirement, is one which should be of interest to any user of a domestic oil burner. Manufacturers of oil burners do not consider it a part of their duty to insist on the equipment of the furnace with definite means for preventing undue temperatures or pressures. Many manufacturers regularly furnish what are known as "aqua-stats" or "pressure-stats," which are automatic in operation; in other words, so arranged that when properly connected, they serve to stop the operation of the oil burner until the pressure or water temperature has dropped to a predetermined point, at which time they again close the circuit to put the burner motor into operation, if at the time the room thermostat is calling for heat.

It will be obvious that if for any reason the room thermostat is held in the "on" position, either on account of the radiator having been turned off or on account of a window being left open, the oil burner will continue to operate automatically. Continued normal operation of this character may easily result in the loss of a considerable quantity of water, and in some cases, has been known to ruin the furnace, or even to start a fire through overheated pipes.

COMPLETE AND EXPLICIT INSTRUCTION AND INSTALLATION DIRECTIONS MINIMIZE ERRORS

Rules 18 and 19,[5] relating to instruction cards and installation, although last in the pamphlet of the Regulations and occupying but a few lines of space, are extremely important. Every oil burner listed by Underwriters' Laboratories is required to be furnished with a complete instruction card printed on substantial paper in a form that may be placed under glass and framed by the user. The householder should thoroughly familiarize himself with this instruction card, and in case of any doubt call on the oil burner manufacturer or on the service man or dealer who made the installation.

An earnest attempt has been made to edit the instructions so as to secure proper operation of the oil burner; but the important link between these instructions and satisfactory operation of the burner is the application of a reasonable degree of intelligence in following the guide provided. In a case of the more simple type of burners, such as the natural draft burners, installation instructions also are shipped with the burners so that in case of installations remote from dealer, the purchaser will have a guide to follow in making the installation.

PURCHASERS SHOULD NOT INSTALL BURNERS

It must be agreed that the practice of having the purchaser make his own installation is not to be encouraged, but where it cannot be avoided, it is believed that the installation instructions are sufficiently complete to enable a man of reasonable intelligence to secure proper conformance to the installation regulations. In the case of a more elaborate burner, the manufacturers furnish their dealers, jobbers, and installers with very complete installation manuals, which in some instances are in loose leaf form so that they may be added to and revised readily from time to time as occasion demands. Strict conformance to the installation regulations and the exercise of reasonable intelligence on the part of the user, and the refraining from attempts to "improve" on either the adjustments or the installation of the burner by those not properly qualified will certainly result in avoiding the possibility of the great increase of the use of domestic oil burners having any material effect on the national fire loss.

EXTRACTS FROM UNDERWRITERS' REGULATIONS REFERRED TO BY MR. SMITH

[1]Rule 1 (a), Regulations for Domestic Oil Burning Equipments, reads as follows:

(a) Storage tanks shall preferably be located outside, underground, with top of tank below the level of the burner. Where conditions are such that top of tank is above the burner, adequate provisions to prevent siphoning shall be provided.

NOTE: For small installation where pipe lines are 1-in. or less, provisions which will break the siphon at time of fire, such as an air inlet held closed with fusible metal located at top of bend, may be acceptable. Weighted foot valves; enlarged pipe section on discharge side of siphon; or air inlets at top bends controlled by pump pressure, are provisions which may be acceptable in any size piping, depending upon the elevation of the tank, and upon specific approval of the inspection department having jurisdiction.

[2]Rule 3 of the Regulations on Domestic Oil Burning Equipment reads as follows:

(a) An open or automatically operated galvanized iron vent pipe without trap and draining to the underground storage tank shall be provided.

(b) Inside or above ground and auxiliary tanks shall be provided with open vent pipes.

(c) All vent pipes shall be of ample size to prevent abnormal pressure in case of fire or when filling, in no case to be less than 1-in. pipe size; such vent pipes shall have the lower end extend through the top into the tank for a distance of not more than 1 inch. Outer ends of vent pipes shall be provided with weather-proof hoods, screened to prevent obstruction by insects and terminating at a point outside of building preferably not less than 3 ft., measured horizontally or vertically from any window or other building opening.

[2]9. Filling of Auxiliary Tanks.

(a) Unless filled as specified in Rule 4 auxiliary tanks shall be filled by pumping from storage tanks.

(b) Tank shall be provided with an overflow connection draining to storage tank. Overflow pipe shall be not less than one size larger than supply pipe from pump.

(c) The overflow pipe of an auxiliary gravity tank shall not be provided with valves or obstructions; but overflow pipe of auxiliary pressure tank shall be provided with interconnected valves or other means for automatically venting tank when filling.

10. PUMPS.

(a) Oil pump used in filling auxiliary tank from the main storage tank shall be of approved type, secure against leaks, with check valves located as close to pump as convenient. Pumps shall be rigidly fastened in place.

(b) Automatic pumps not an integral part of the oil burner shall be of an approved type preferably provided with automatic means for preventing continuous discharge of oil in case of pipe breakage.

'12. VALVES.

(a) Readily accessible valves shall be provided near each burner and also close to the auxiliary tank in the pipe line to burners.

(b) Control valves shall be of approved type provided with stuffing box of liberal size, containing a removable cupped gland designed to compress the packing against the valve stem and arranged so as to facilitate removal. Valve shall be designed to close against the supply, and to prevent withdrawal of stem by continued operation of the handwheel. The use of packing affected by the oil or heat is prohibited.

'18. INSTRUCTION CARD.

A card giving complete instructions in regard to the care and operation of the system shall be permanently posted near the apparatus. Said card shall be placed under glass and framed.

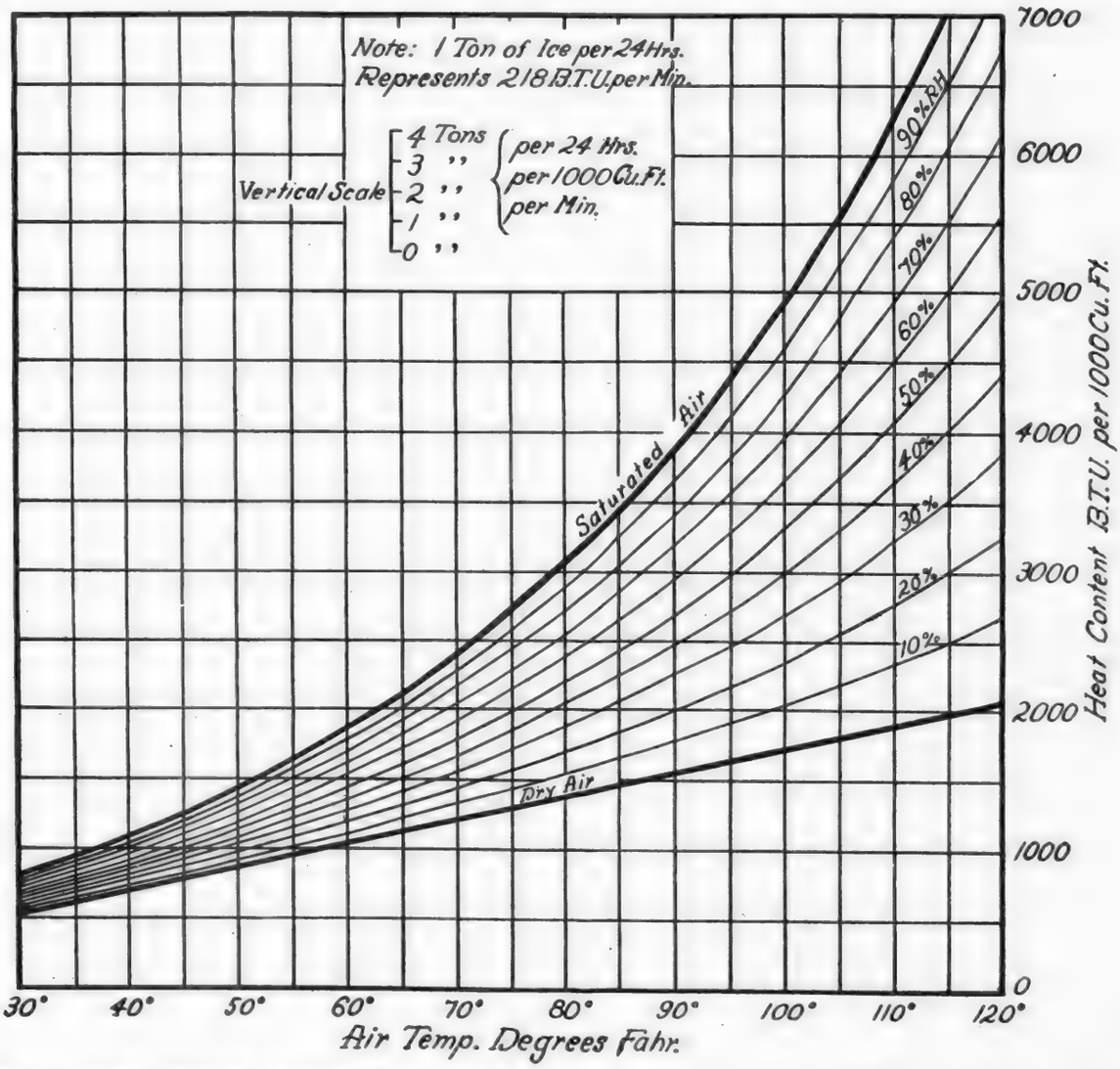
19. INSTALLATION.

Oil burning equipment shall be installed only by properly qualified mechanics experienced in this kind of work. It is recommended that systems be installed by the manufacturer.

A Simplified Air-Conditioning Chart

A SIMPLIFIED chart for determining the heat content of air with varying temperature and moisture conditions has been devised by A. Lewis, chief mechanical engineer of the Commonwealth Works Department of Australia. The small scale shown at the top of the chart is for use in figuring the required refrigeration per 24 hrs. per 1000 cu. ft. per minute.

To use the chart, determine the point on the vertical scale at which the temperature line of the incoming air intersects the humidity curve. Project this point of intersection toward the right and mark it on the B.T.U. scale. Now, take the point to which the air is to be reduced in temperature and the desired humidity at this temperature and project this intersection also to the right, making another mark on the B.T.U. scale. The distance between these two marks will show the number of B.T.U. to be removed from the air. The same distance, laid along the refrigeration scale, will indicate the tons of refrigeration required for this B.T.U. removal.



This is the twenty-first lesson (continued) of The Heating and Ventilating Magazine's

New Home-Study Course in Gravity Steam and Water Heating

Lesson No. 21 (continued)—Vapor Heating Systems

By Ara Marcus Daniels

RADIATORS having the supply connection at the top are preferred for vapor systems since this puts the supply valve in the most accessible position.

PRINCIPLE OF VAPOR SYSTEM

In the U tube A of Fig. S-6-2, it is assumed that atmospheric pressure is acting on the surface of water in each leg of the tube. Hence, the water level is the same in both legs.

A column of water 1 ft. high having a transverse area of 1 sq. in. exerts a pressure of practically 0.434 lb. per square inch. Thus, the equivalent static head of water for a pressure of 2 lbs. per square inch will be $2 \div 0.434 = 4.6$ ft.

If a uniform pressure of 2 lb. per square inch be exerted on the water surface in the left leg of the U-tube B, Fig. S-6-2, the water would be forced into the right leg until the vertical difference in the height of the two surfaces, represented by X, became 4.6 ft. (as per calculations above.)

If the pressure exerted on the water surface of the left leg be reduced to 1 lb. per square inch, the height of water column Y, U tube C, Fig. S-6-2, will be reduced to 2.3 ft. If the pressure be still further reduced to 4 oz. per square inch or ¼ lb., the height of balancing column Z, U tube D, Fig. S-6-2, will suffer a corresponding reduction, while for 1 oz. pressure the height W of U tube E, Fig. S-6-2, indicates that for an extremely low pressure above atmospheric requires but a slight hydrostatic head to balance it.

If, now, the U tube be replaced by a boiler, representing one leg of the tube, and a small vessel, open to the atmosphere, representing the other leg of the U tube, see A, Fig. S-6-3, and the bottoms of the vessels be connected through a pipe line, a difference in water levels will exist and this difference will be governed by the pressure in the boiler.

Work Problem S-6-5.

The introduction of a steam main, radiator and return piping connected as shown at B, Fig. S-6-3, is all that is required to produce a vapor plant diagram with radiator traps and gravity return. A study of this diagram in connection with Fig. S-6-1 should make perfectly clear the operating principle of such a vapor plant.

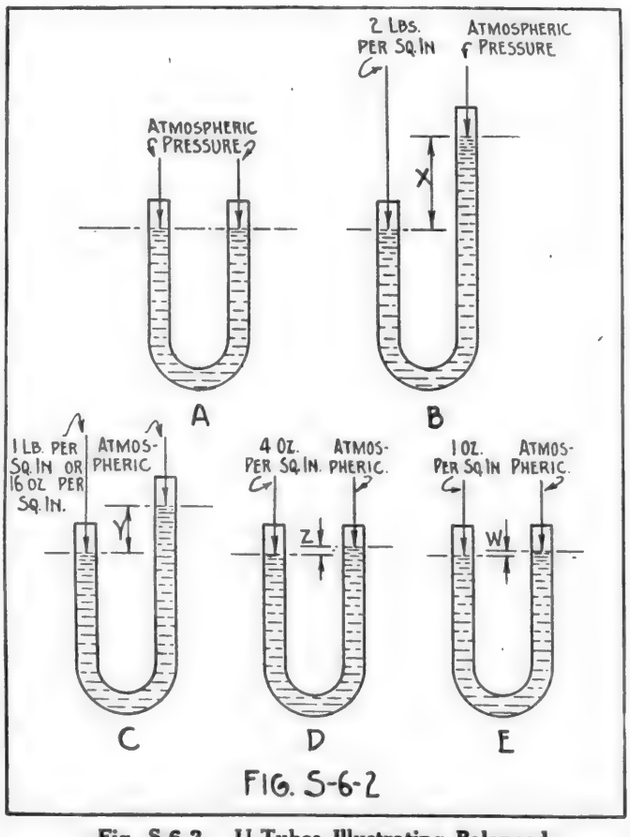


Fig. S-6-2. U-Tubes Illustrating Balanced Pressure Conditions

In a vapor system, a positive pressure from 1 oz. to 1 lb. is usually carried on the boiler. The pressure in the return line is higher than that of the surrounding atmosphere, due to the column of water maintained in the return. The presence of this static head of water which counter-balances the pressure carried in the boiler and which exists between an opening to the atmosphere and the boiler makes it possible to air-vent the system automatical-

ly, while, at the same time, carrying a positive pressure on the boiler. Thus, for any given positive pressure desired on the boiler, it is necessary that the lowest part of the return, where an air vent is located, and the lowest radiator be high enough above the normal boiler water-line to permit the necessary static head. Thus, the water may back up in the return and establish this head, all air and water from radiators being carried through a dry return to a collecting tank, at which point venting of the entire system occurs.

For practical reasons, the collecting tank is located higher above the boiler water-line than theoretically required. Manufacturers who build equipment especially for vapor plants always specify this distance for their particular apparatus. The student should acquaint himself with such installation details for the various trade systems with which he may come in contract. Most manufacturers are glad to supply serious-minded enquirers with copies of their literature. In making such a request, however, the enclosure of return postage is a courtesy that will be appreciated.

Work Problem S-6-6.

PIPE SIZING FOR VAPOR SYSTEM WITHOUT RETURN TRAP

While it is difficult to lay down any hard and fast rules for sizing pipes, yet Tables S-6-7 to S-6-11 inclusive may be expected to produce satisfactory designs. These tables and others that follow will likely vary slightly from other similar tables. The

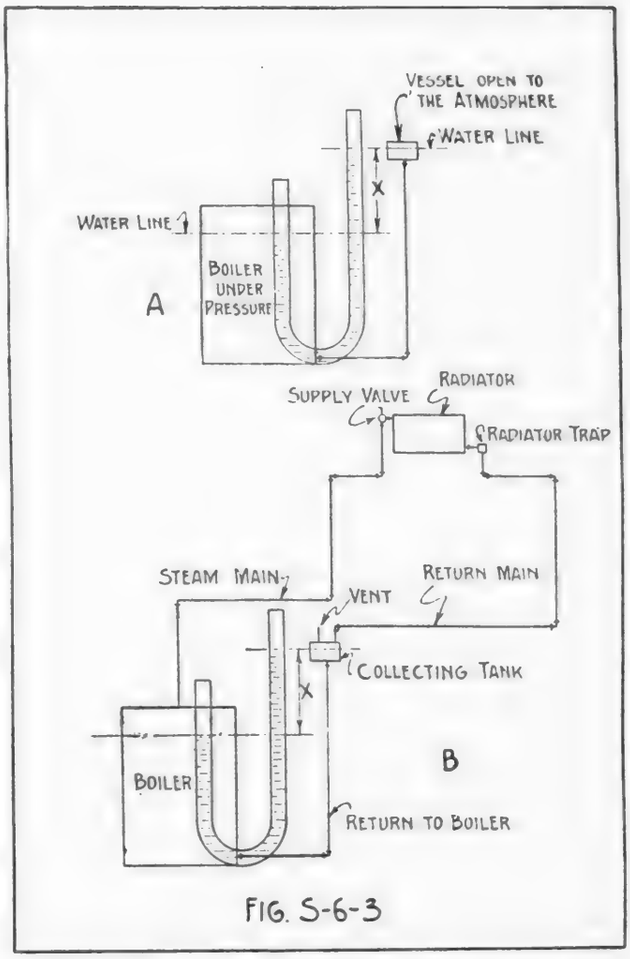


FIG. S-6-3

Diagrammatic Layout for a Simple Vapor Heating System without Direct Return Trap

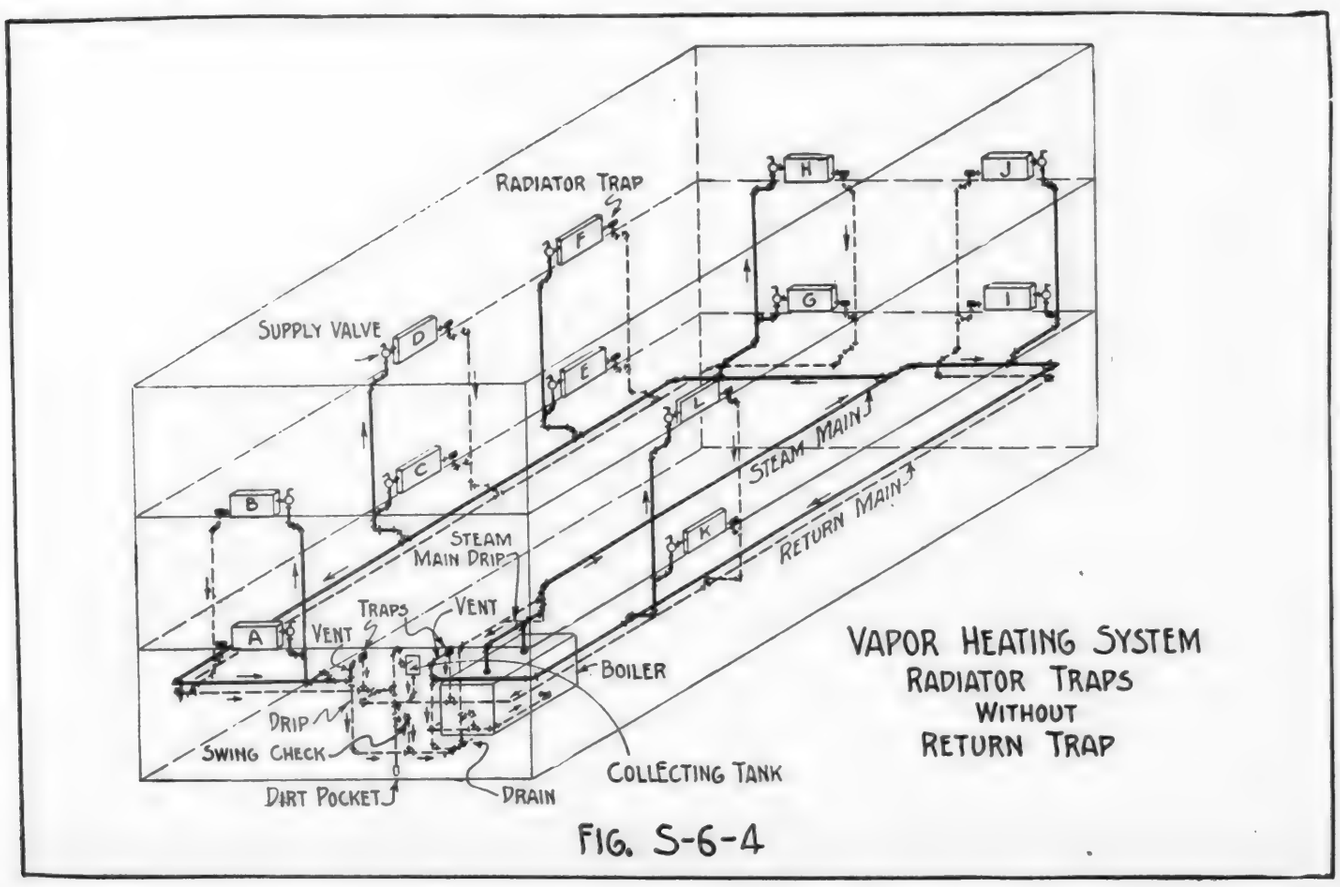


FIG. S-6-4

TABLE S-6-7
RADIATOR CONNECTIONS
HOT WATER TYPE RADIATOR - TOP INLET

SQUARE FEET RADIATION DIRECT	SUPPLY			RETURN		
	INLET VALVE SIZE INS.	VERTICAL PIPE TO INLET VALVE INS.	HORIZONTAL RUNOUT TO RISER INS.	TRAP NO.	VERTICAL PIPE TO TRAP INS.	HORIZONTAL RUNOUT TO RETURN RISER INS.
1 - 40	1/2	1/2	3/4	1	1/2	3/4
41 - 80	3/4	3/4	1	1	1/2	3/4
81 - 100	3/4	3/4	1 1/4	1	1/2	3/4
101 - 140	1	1	1 1/4	2	1/2	3/4
141 - 180	1	1	1 1/2	2	1/2	3/4

WITHOUT RETURN TRAP

TABLE S-6-8
RISERS

EQUIVALENT LENGTH FEET	SUPPLY					RETURN
	3/4"	1"	1 1/4"	1 1/2"	2"	3/4"
100	40	80	160	250	400	500
200	25	55	115	175	320	320
400	20	40	80	125	240	250

WITHOUT RETURN TRAP

TABLE S-6-9
SUPPLY MAINS
SQUARE FEET DIRECT RADIATION

PIPE SIZE INS.	LENGTH IN FEET			
	200	300	400	500
2	320	282	248	218
2 1/2	560	456	400	352
3	1000	810	710	625
3 1/2	1500	1180	1035	910
4	2000	1640	1440	1270
4 1/2	2680	2180	1920	1690
5	3600	2940	2580	2260
6	5780	4700	4130	3640

WITHOUT RETURN TRAP

TABLE S-6-10
RETURN MAINS

PIPE SIZE INS.	CAPACITY SQ. FT.
1	300
1 1/4	600
1 1/2	1800
2	3000
2 1/2	5500

WITHOUT RETURN TRAP

TABLE S-6-11
SUPPLY DRIPS

PIPE SIZE INS.	CAPACITY SQ. FT.
1 1/4	1000
1 1/2	2000
2	4000
2 1/2	6000

WITHOUT RETURN TRAP

TABLE S-6-12
RADIATOR CONNECTIONS
HOT WATER TYPE RADIATOR - TOP INLET

SQUARE FEET RADIATION DIRECT	SUPPLY			RETURN		
	INLET VALVE SIZE INS.	VERTICAL PIPE TO INLET VALVE INS.	HORIZONTAL RUNOUT TO RISER INS.	TRAP NO.	VERTICAL PIPE TO TRAP INS.	HORIZONTAL RUNOUT TO RETURN RISER INS.
1 - 40	1/2	1/2	3/4	1	1/2	3/4
41 - 100	3/4	3/4	1	1	1/2	3/4
101 - 180	1	1	1 1/4	2	1/2	3/4
181 - 300	1 1/4	1 1/4	1 1/2	2	1/2	3/4

WITH RETURN TRAP

TABLE S-6-13
RISERS

EQUIVALENT LENGTH FEET	SUPPLY							RETURN	
	3/4"	1"	1 1/4"	1 1/2"	2"	2 1/2"	3"	3/4"	1"
200	45	90	190	290	570	930	1650	600	1200
400	30	60	136	200	410	670	1170	430	850
600	25	50	110	165	330	530	940	340	670
1000	20	40	85	130	250	410	730	260	530

WITH RETURN TRAP

TABLE S-6-14
SUPPLY MAINS
SQUARE FEET DIRECT RADIATION

PIPE SIZE INS.	LENGTH IN FEET					
	100	200	300	400	500	600
2	670	570	470	410	360	330
2 1/2	1090	930	760	670	590	530
3	1930	1650	1340	1170	1030	940
3 1/2	2810	2400	1950	1710	1510	1370
4	3900	3340	2720	2380	2100	1900
4 1/2	5220	4460	3630	3180	2800	2550
5	7000	5950	4850	4260	3740	3400
6	11200	9550	7780	6830	6000	5460

WITH RETURN TRAP

TABLE S-6-15
RETURN MAINS

PIPE SIZE INS	SQUARE FEET	
	UNDER 400 FT	OVER 400 FT.
1	400	300
1 1/4	1400	1000
1 1/2	2700	1700
2	5500	3400
2 1/2	9000	5500
3	16000	10000
3 1/2	23000	14000
4	32000	20000

WITH RETURN TRAP

TABLE S-6-16
SUPPLY DRIPS

PIPE SIZE INS	CAPACITY SQ. FT.
1 1/4	1400
1 1/2	2700
2	5500
2 1/2	9000
3	16000
3 1/2	23000
4	32000

WITH RETURN TRAP

student should ever realize that judgment and experience must be given due consideration in the design of any job and hence all tables should be considered elastic.

Students who have completed the work up to this point have had sufficient practice in sizing pipes to permit the omission of radiator group layouts and for this reason such as have been included with previous lessons are not included herewith.

Fig. S-6-4 illustrates a vapor heating system installed in phantom building. An optional work problem is assigned therewith.

Work Problem S-6-7.

VAPOR HEATING SYSTEM WITH RETURN TRAP

The function of a return trap in a heating system is to return water to the boiler under conditions that prevent or interfere with assured gravity return.

With a heating system such as has been described in the foregoing part of this lesson or, in fact, with any system equipped with radiator traps, there is liable to be two pressures on the system, especially if the radiator traps function properly without leakage. While such different pressures may be slight, yet, under certain conditions of operation the difference in pressure on the supply side and on the return side may be sufficient to prevent the proper return of the water of condensation to the boiler by gravity.

Fig. S-6-5 illustrates a simple vapor heating system with return trap. Suppose steam is being generated in the boiler faster than it is being condensed in the radiators and piping of the system. Steam will then fill the main, and all piping and radiators from the boiler to the radiator trap. The air vent valve installed at the end and low point of the return main permits water of condensation to flow downwards, through the check valve C_1 and up into the return trap. This return trap, being connected through a vent opening into the return line, places the trap under the same pressure as exists in the return main.

As water passes through check valve C_1 and rises into the body of the return trap, the operating mechanism therein opens the connection to the steam line and closes the vent connection. The same pressure will then exist in the return trap as exists in the boiler. This will permit the water collected in the return trap to drain by gravity through check valve C_2 into the boiler, since the water in the trap is under a greater hydrostatic head than the water in the boiler.

When the return trap has been emptied sufficiently, the trap mechanism operates to close the valve to the steam line and open the vent valve. Water will then again flow into the return trap through check valve C_1 and the operation of returning it to the boiler be repeated.

The position of the return trap above the water line in the boiler, that is the value of distance X, is most important. It is dependent upon boiler operating pressure and the total radiating or condensing surface of the system. Manufacturers who build return traps always specify this distance for their particular apparatus.

Work Problem S-6-8.

PIPE SIZING FOR VAPOR SYSTEM WITH A RETURN TRAP

With the same admonition concerning pipe sizing tables as was given above, Tables S-6-12 to S-6-16 are presented. The student should note

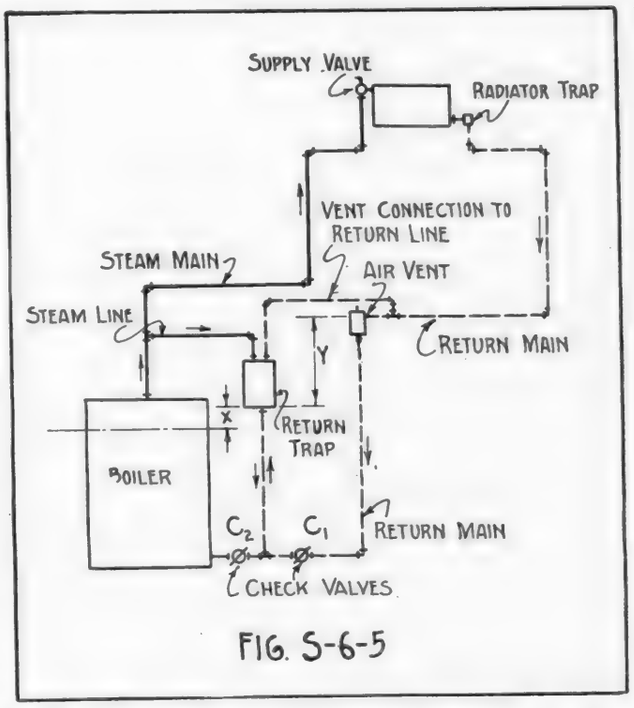


Fig. S-6-5. Diagrammatic Layout for a Simple Vapor Heating System with Direct Return Trap

that the design of a system using a direct return trap will differ from one in which only radiator traps were installed.

Work Problems S-6-9, S-6-10.

The next lesson, to appear next month, will discuss piping details for the installation of steam systems, steam specialties used in connection therewith, and the determination of depth of pits for boilers.

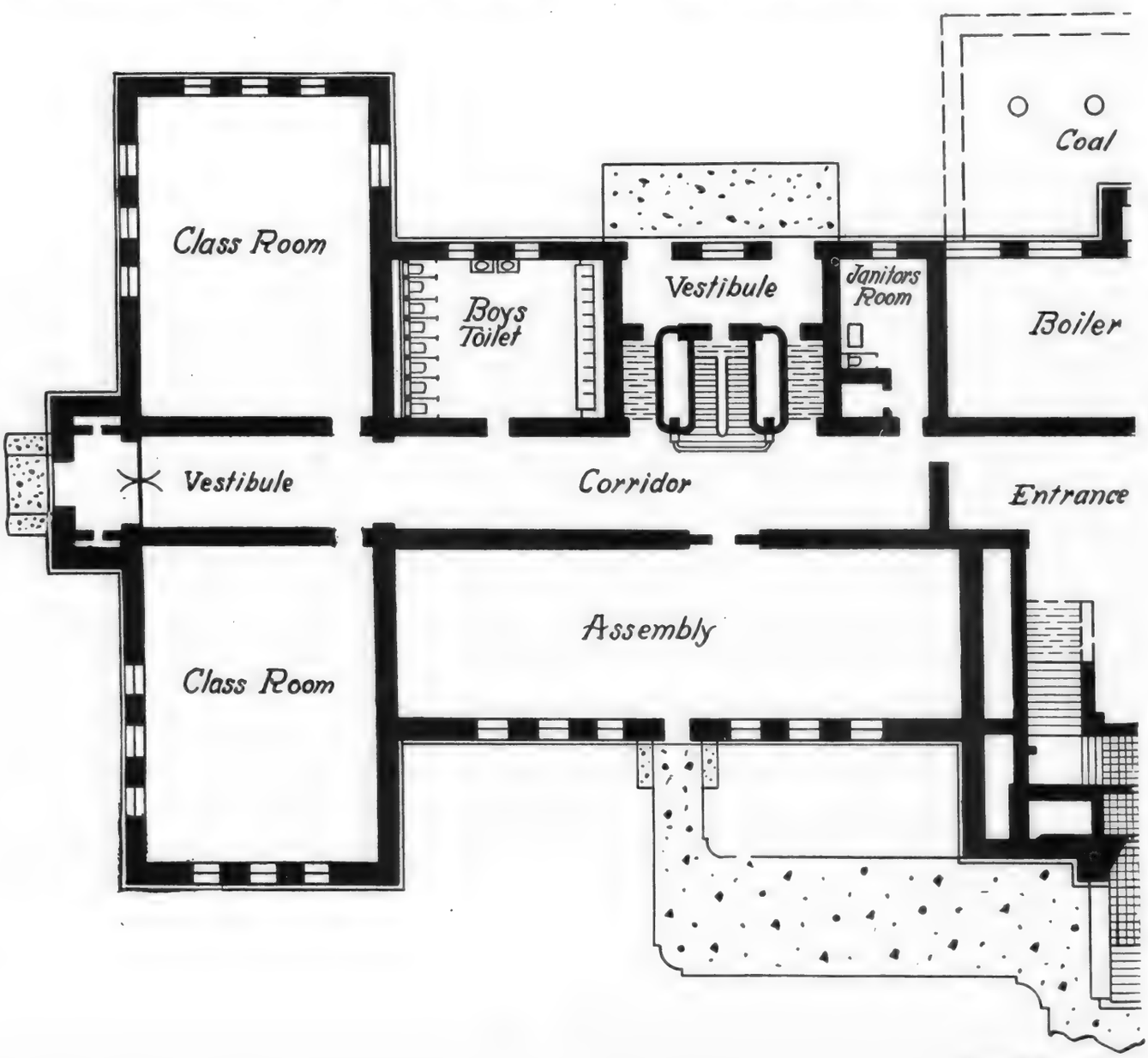
In order to prevent any confusion on the part of those who have been pursuing the "Home Study Course," the matter of heating systems operating below atmospheric pressure has not yet been discussed and, for that reason, the operation of vapor systems at or above atmosphere only has been taken up so far. The desirable characteristic of operating at a negative pressure and a description of such operation will be included in one of the later lessons.

Competition in School Ventilation

Successful Contestant Will Receive a Prize of Fifty Dollars, While the Second and Third Best Designs Will Each Be Awarded Twenty Dollars and a Year's Subscription to The Heating and Ventilating Magazine

Qualifications

1. Any subscriber of The Heating and Ventilating Magazine may compete.
2. Any system of ventilation may be used as desired, such as gravity, window, unit, fan and duct; either with or without air conditioning, washing, humidification, ozone, etc.
3. Apparatus may be operated by any means desired, such as coal, gas, oil, electricity or steam.
4. Questionnaire answers must be given in full and a short explanation, not to exceed 1000 words, may be given at the end to justify the system used and to explain its superiority over all other systems not selected by the contestant.
5. Answers must be mailed to the magazine not later than January 1, 1927, and must be received in the office of the magazine not later than January 5, 1927; announcement of the winners will be made in the March issue.



Ground Floor Plan

The Contest

THE HEATING AND VENTILATING MAGAZINE offers $50.00 for the best ventilating design for the school building, a ground floor plan of which is here shown. This competition is for two purposes; first, to see what our readers really consider to be the best ventilating system for schools and, second, to give our readers the benefit of all the ideas advanced. For the second and third best solutions, a prize of $20.00 and a year's subscription to THE HEATING AND VENTILATING MAGAZINE will be awarded, while any others of interesting character and sufficiently good to deserve publication in the magazine will be paid for at regular space rates.

The judges to decide on the merits of the various schemes submitted will be three in number, of whom two will be experienced engineers and the third will be the editor of this magazine.

BASIS OF JUDGING MERITS OF VARIOUS DESIGNS

Merits of various designs will be considered as follows:—

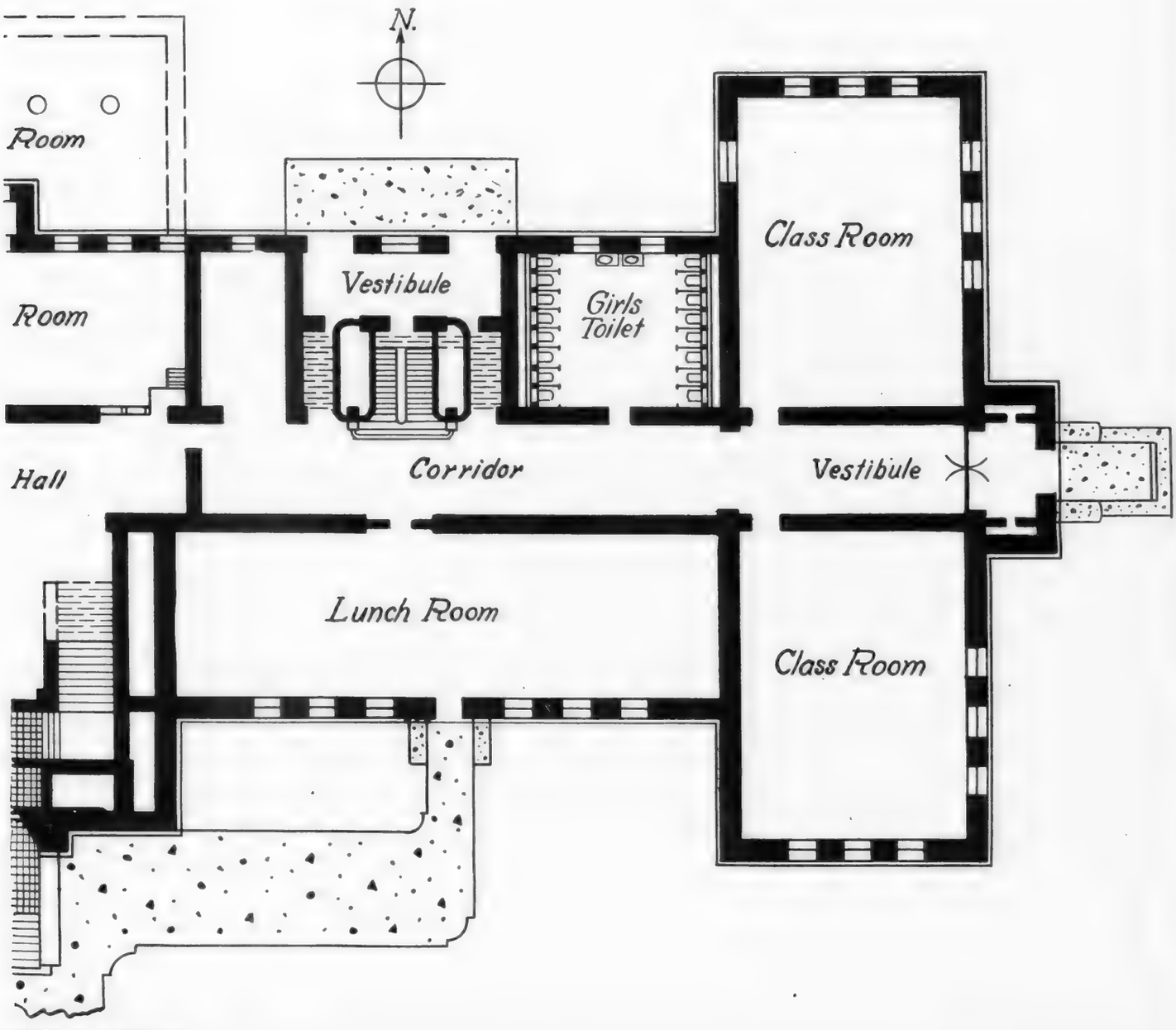
First. Design or Scheme Used.

Second. Correctness of Detailed Information in Questionnaire.

Third. Neatness of Execution.

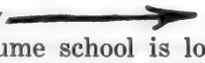
GENERAL INSTRUCTIONS

Mark in black ink on the typical ground-floor plan of the school shown where the ventilating registers will be placed and the size and quantity of air in C. F. M. for each register, assuming 50



of Contest School

pupils in each classroom. Also, an arrow with a straight tail for all supply registers and an arrow with a curved tail for all vent registers thus:

Supply  Exhaust

Assume school is located in the congested section of a city of 400,000 population in a reasonably cold climate, say, where the minimum outside temperature reaches zero, and that there is a duplicate story immediately above the ground floor shown. Provide ducts for the upper story, assuming your registers are located in the same or similar position to the ones you are showing for the ground floor. Draw in all ducts back to the fan room.

Locate fan room and make ¼-in. scale plan and elevation of apparatus therein. Size all ducts, fans, heaters, air washers, unit heaters, flues, etc., which you have used. Neglect boiler and steam piping, but tell if you intend placing radiators in the rooms and to what temperature the room will be heated by them if so used.

Questionnaire

Answer the following questions shortly and definitely:

1. **What system of ventilation have you indicated on your drawing as being the best for this school building? Gravity, open window, unit, fan and duct?**
2. **What distance above the floor would you place the bottom of the supply registers (if any are included)?**
3. **What distance above the floor would you place the bottom of the exhaust registers (if any are included)?**
4. **What outlet velocities would you use for the supply registers (if any are included)?**
5. **What inlet velocities would you use on the exhaust registers (if any are included)?**
6. **What are the air velocities used (a) through the supply flues (b) through the exhaust flues (c) through the heaters (d) through the air washer (e) through the air filter, if used (f) highest velocity used in duct system (g) lowest velocity used in duct system.**
7. **What means, if any, would you use to clean the air?**
8. **What means, if any, would you use to humidify the air?**
9. **What means, if any, would you use to put ozone in the air?**
10. **Are you using all fresh air, all recirculated air or a combination of both? If combination is used, explain proportions, etc.**
11. **Do you use volume dampers, deflectors, split dampers or other devices to control the flow of air? If so, what?**
12. **Describe the registers or register faces used. Are they with or without valves?**
13. **What is the capacity of the fan in C.F.M. or, if unit heaters are used, what is the capacity of each?**
14. **What size of motor will be required for each fan and what is the total K.W. per hour necessary to operate the system?**
15. **What is the total B.T.U. per hour required to heat the air in your scheme under ordinary weather conditions (say 50% relative humidity), with zero outside temperature. How much additional heat will be required for the humidifying you propose (if any)?**
16. **Where and to what extent do you contemplate the use of covering? Describe covering and locations where it should be used.**
17. **What means have you provided for preventing apparatus noises being transmitted to the rooms?**
18. **Assuming you had an alternating current supply to operate your motor, how would you connect the motor drive to the fan—belt, chain drive, direct connected, geared, etc.?**
19. **On what basis did you determine the air quantity necessary for ventilation? If on the basis of cubic feet per minute per pupil, what number of cubic feet did you use? If a basis of air changes, how many did you use? If for any other basis, describe same.**
20. **Describe in not over 1000 words, just why you feel that the ventilating system you have proposed is superior to all other schemes for this particular installation.**

Mail your plan, questionnaire and other information not later than January 1, 1927. Address: Contest, care of Heating and Ventilating Magazine, 1123 Broadway, New York.

Systems and Standard Sizes for Mechanical Drawings

THE subject of systematizing the drafting-room and working to standard sizes of drawings is one which is engaging the engineering world's attention. A paper presented at a meeting of the Western Washington Section of the A.S.M.E. of Seattle, Wash., January 20, 1926, by D. Kwartz, states that every drafting-room must have some sort of drawing sizes, as well as some system for numbering drawings for ready reference.

In manufacturing shops the system of making one drawing for each piece seems to be recognized as the best practice. In many instances, these drawings are 8½ x 11 in., the regular letter size. There are some advantages connected with this particular size, as for instance: (a) The blue prints file or mail nicely with letters. (b) Standard letter files could be used for filing the blueprints. It is thought in the paper that it would be easier to use this standard size than any other, owing to the fact that many drawing rooms are now already using 8½ x 11 in. sheets. At the same time, some objections to such small drawings may be listed as: (a) The great number of small tracings which are annoying to handle in the file drawers. (b) Blueprints of such tracings cost more per square foot than blueprints for larger tracings. To overcome these objections, it is suggested in the paper that the tracing be made large enough so as to contain more details and to be 18 x 24 in. in size, with a margin of ½ in. all around the print, as well as 1 in. extra margin on the left-hand end for binding purposes.

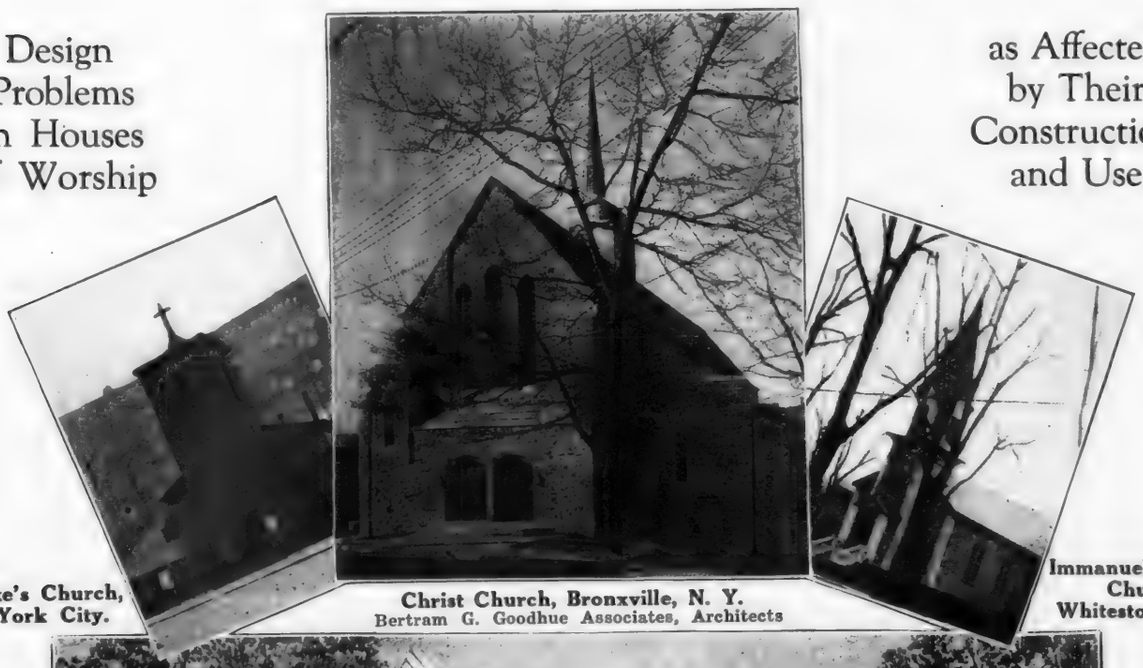
It is further stated that there will be a considerable saving of time in using the 18 x 24 in. sheets with more details on them than using four 8½ x 11 in. sheets separately. It is also claimed that the 18 x 24 in. drawing will probably be found to be the most popular drawing size used in the United States. The 24 x 36 in. size sheet was next discussed and the objection to it, was the necessity of waiting longer to get a drawing of the large size sheet off the board than with the small, as well as the fact that any accident occurring to the sheet, would destroy a larger amount of work than with a smaller sheet. It is also pointed out that there is an undesirable psychological effect on both the employer and the draftsmen produced by working too long on the same sheet.

Church Heating and Ventilation

By Alfred J. Offner, M.E.

Offner and McKnight, Consulting Engineers, New York City

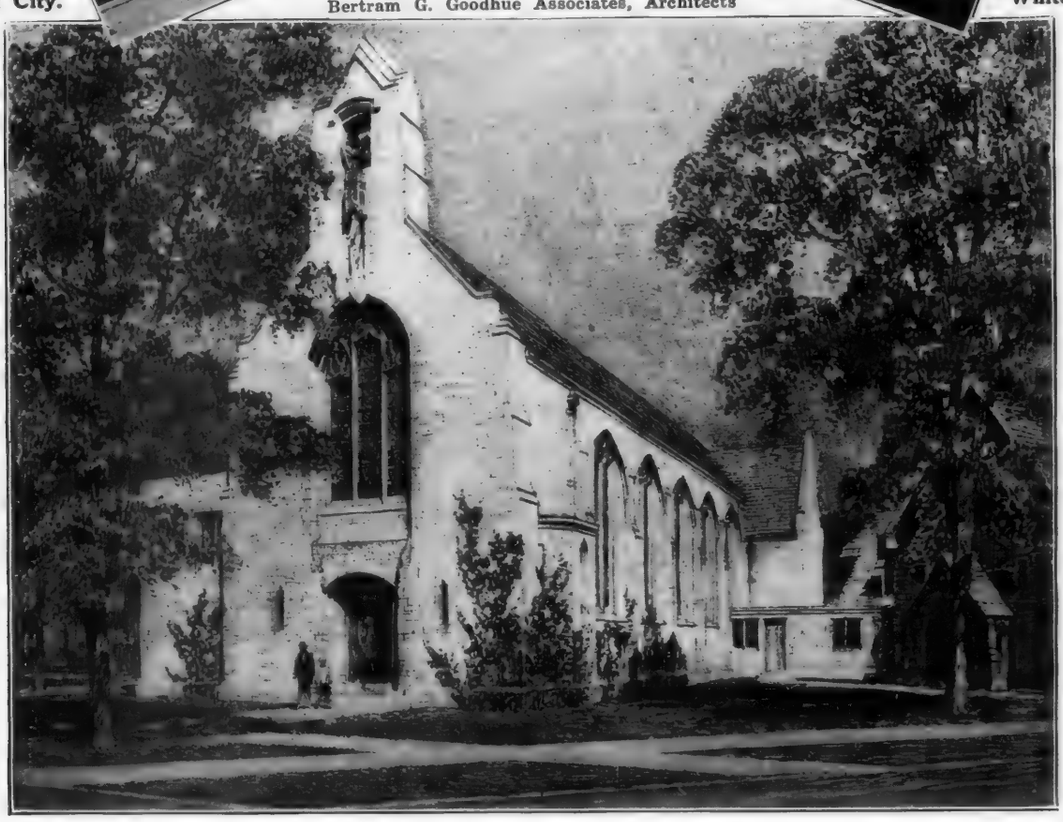
Design Problems in Houses of Worship as Affected by Their Construction and Use



St. Luke's Church, New York City.

Christ Church, Bronxville, N. Y.
Bertram G. Goodhue Associates, Architects

Immanuel Lutheran Church, Whitestone, L. I.



St. John's Church, Buffalo, N. Y.
Bertram G. Goodhue Associates, Architects

IN the beginning man was governed by fear, fear for his existence, fear for his safety, fear for his life. In natural phenomena he only saw occurrences working against him, at least so he thought. The sweep of the winds, thunder, lightning, the growling of the beasts all put fear into him. Dropping boulders struck him, falling trees just missed him, diseases attacked him, death overwhelmed him. It seemed that sky, earth, and sea were against him, all bent on his destruction. Man was afraid.

He first tried to overcome these numerous en-

emies by physical attacks, but they were of no avail. He then thought these occurrences were governed and actuated by spirits, evil spirits out to do him harm. He tried to appease these evil spirits by magic, by the muttering of unmeaning sounds, by wild dances, but also all without avail. Nature still seemed to be against him.

As primitive man developed, he started to believe in good spirits, spirits that would overcome the bad ones, spirits that would protect him against harm. He had faith, faith in something that would help him. So in faith, religion was born.

The spirits were pleaded with, sacrifices were offered to obtain favors from them. Idols were made, first to scare the evil spirits away, later to draw the good spirits on. The idols were smeared with blood and offerings were made in food to attract the spirits. To protect these idols and offerings against the elements, they were put in caves or rude coverings were erected over them. So the first church was built.

As civilization advanced, groups of people became villages and villages became cities; families became tribes, and tribes nations; caves containing idols became huts and huts became temples. As rulers and nations grew and became richer, temples became larger and more elaborate, all to bring the favor of the gods to those building them.

EARLY CHURCHES NOT HEATED

The first temples and churches were located in the torrid zone, where nature took care of the heating and ventilation. As mankind moved westward and penetrated cooler climates, he protected himself against the increasing cold by wearing more clothes and building his houses of worship of more massive construction, both for strength and protection.

Nearly every one of the world-famous churches and cathedrals built throughout Europe during the last few centuries has no means of protecting the worshippers against cold or methods of improving the air conditions. The heat absorbed by the massive structures during the summer, together with the small heat transmission, seems to hold these structures during the cold months in a fairly comfortable condition. But as civilization demands more and more comforts, mankind also insists on his houses of worship being properly heated and ventilated.

The complexity of modern church construction, the beauty of design, and the uses and arrangements of church buildings, all present unusual problems in the design of the heating and ventilating systems.

FACTORS GOVERNING HEATING DESIGN

The temperature to which the nave of a church is to be heated is taken at from 60° to 65° F. While this temperature, might seem low for the men who sit without hats and top coats, a higher temperature would become uncomfortable for the ladies who keep their hats and coats on.

In churches having high walls and large glass areas, additions must be made for this in calculating the heating requirements. To the total heat transmitted through wall and glass, an addition of 1% for every foot over 15 ft. in height is a fair allowance.

While certain organ manufacturers are opposed to it, the organ chambers must be heated, or at least tempered, otherwise drafts of cold air will be experienced.

THE QUESTION OF REHEATING

Church buildings, in so far as they apply to heating, may broadly be divided into two classes, those which hold services only on Sundays, certain re-

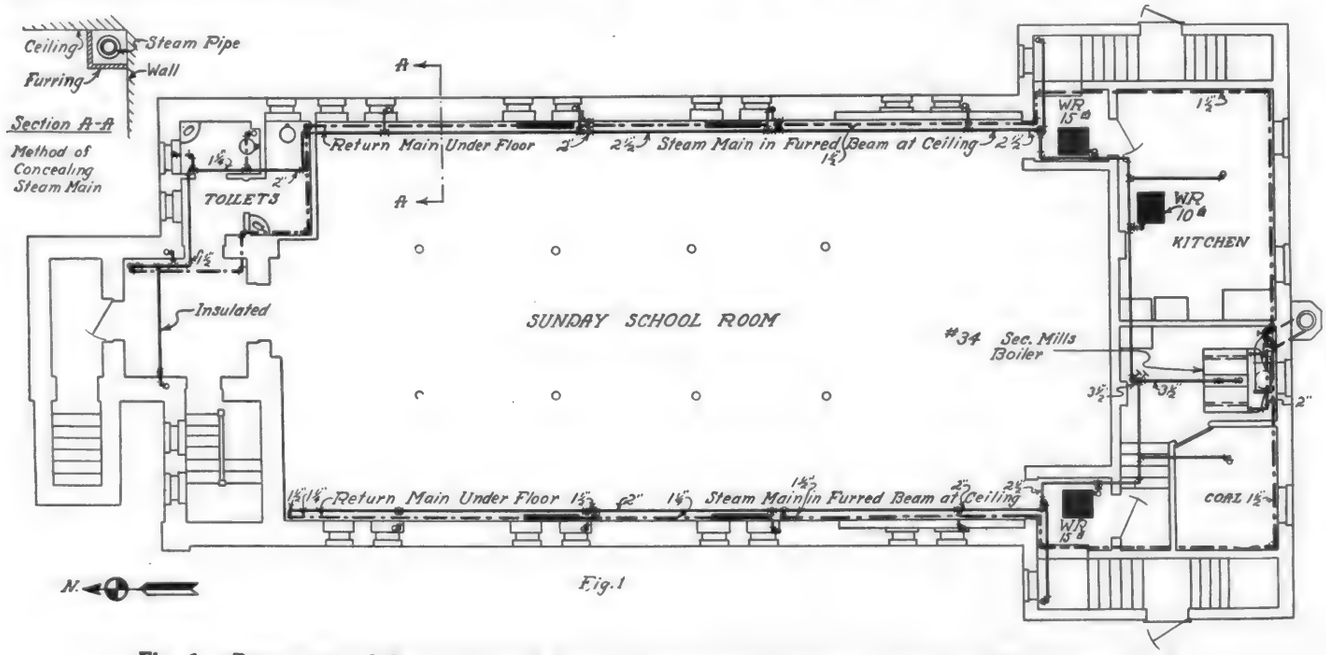


Fig. 1. Basement and Sunday School Room of Immanuel Lutheran Church at Whitestone, N. Y.

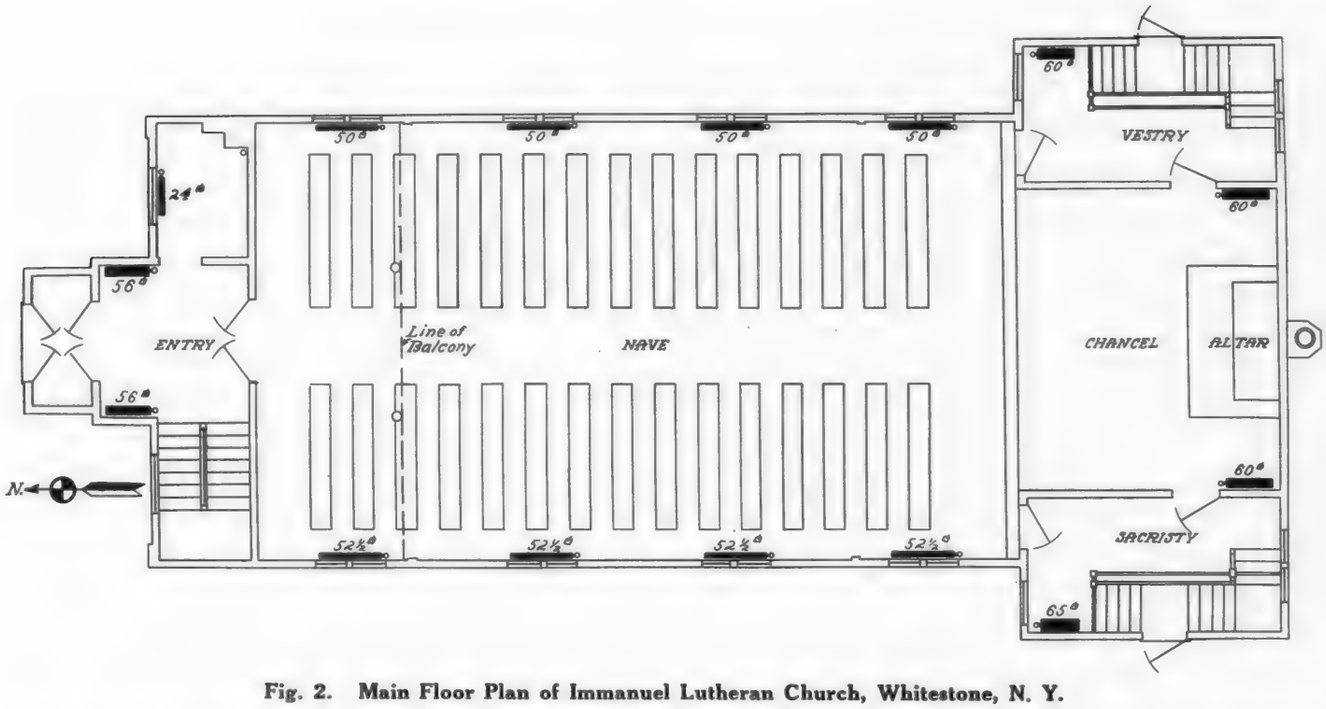


Fig. 2. Main Floor Plan of Immanuel Lutheran Church, Whitestone, N. Y.

ligious holidays, and on special occasions, such as christening, weddings, funerals, etc., and those churches which, in addition to Sunday services, are open all week and hold services on these days.

In those church buildings, which come under the first heading, it is often intended to provide little or no heat during the week. Under these conditions, if the heating is done by radiation, additions must be made to the heating requirements for quick re-heating, the amount of this addition depending on the temperature to which the building is permitted to cool and the period of time allowed for re-heating.

Making allowances for re-heating enlarges the apparatus and increases the initial cost. It will be found, in nearly every case, to be cheaper, in the long run, not to make an allowance for reheating but to insist on continuous heating, at least during cold weather. All of the radiators need not be turned on. As a rule, little or no fuel is saved by interruption of heating service, during very cold weather.

With a blower system, having a by-pass permitting the recirculation of the air, no allowance for reheating need be made, as quick results can be obtained under such conditions.

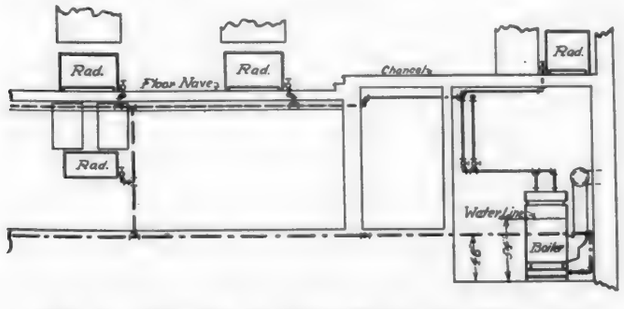


Fig. 3. Elevation of Boiler Room and Piping for Immanuel Lutheran Church, Whitestone, N. Y.

In those church buildings which are open all week, the question of reheating does not enter into the calculations.

SEPARATE SYSTEMS FOR DIFFERENT PORTIONS OF BUILDING

It is desirable, if at all possible, so to arrange and valve the piping that the heating of the church

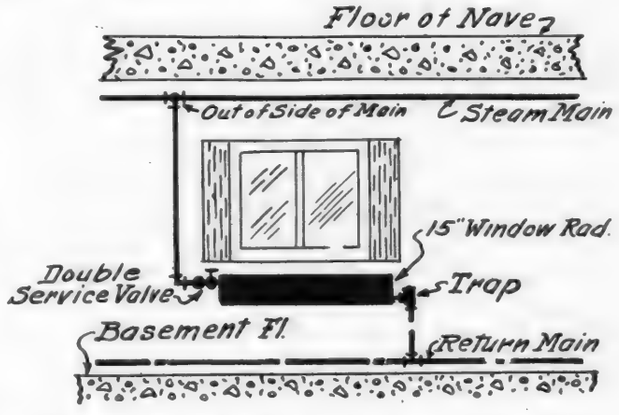


Fig. 4. Another Method of Heating a Basement Sunday School Room

proper, and the rooms used in conjunction with same, be kept separate from the rest of the building which is used throughout the week. This will permit, in mild weather, the convenient shutting off of such parts of the building not requiring heat, resulting in a saving of fuel.

If parts of the building are permitted to cool off, the person tending to the fire must clearly understand that the heat must be started or turned on a sufficient length of time before the rooms are used to permit them to reach the proper temperature.

A church may be heated by three methods—stoves, heated air, and radiation.

HEATING BY STOVES

Heating by stoves is possible only for small rural churches, where cost and conditions do not permit the installation of a warm-air furnace, steam or water heating system. The writer remembers the church he attended in his youth, a fair sized building. It had four large stoves, one located in each corner of the auditorium. The auditorium as a whole was comfortable, but of course, those sitting near the stoves were warm if not over-warm, while those farther away were not so comfortable. With interesting and inspiring sermons, these discomforts were easily forgotten.

In St. Paul's Chapel, which has its back to the world-famous Broadway of New York City, may still be seen the four stoves which heated it at one time. In 1766, when this church was built, Broadway was the less important of the two streets on which it stands. It probably had no means of heating in the beginning, while now it has a steam heating system.

Heating by air can be accomplished by warm-air furnace systems, either by gravity or fan; or by indirect steam radiation, also either by gravity or fan.

HEATING BY WARM-AIR FURNACES

Gravity warm-air furnace heating is suitable for small churches. The initial cost of installation is

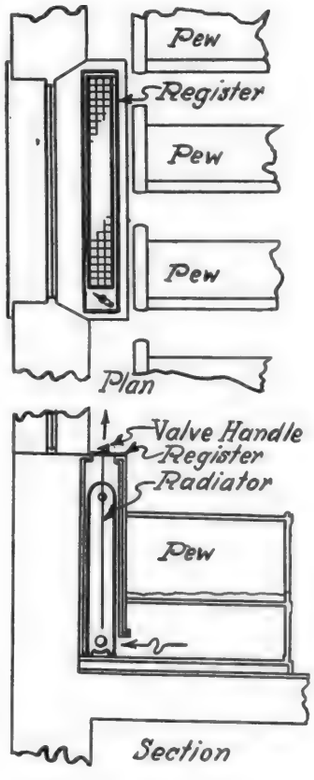


Fig. 5. Radiator Enclosures Used in St. Luke's Church, New York City

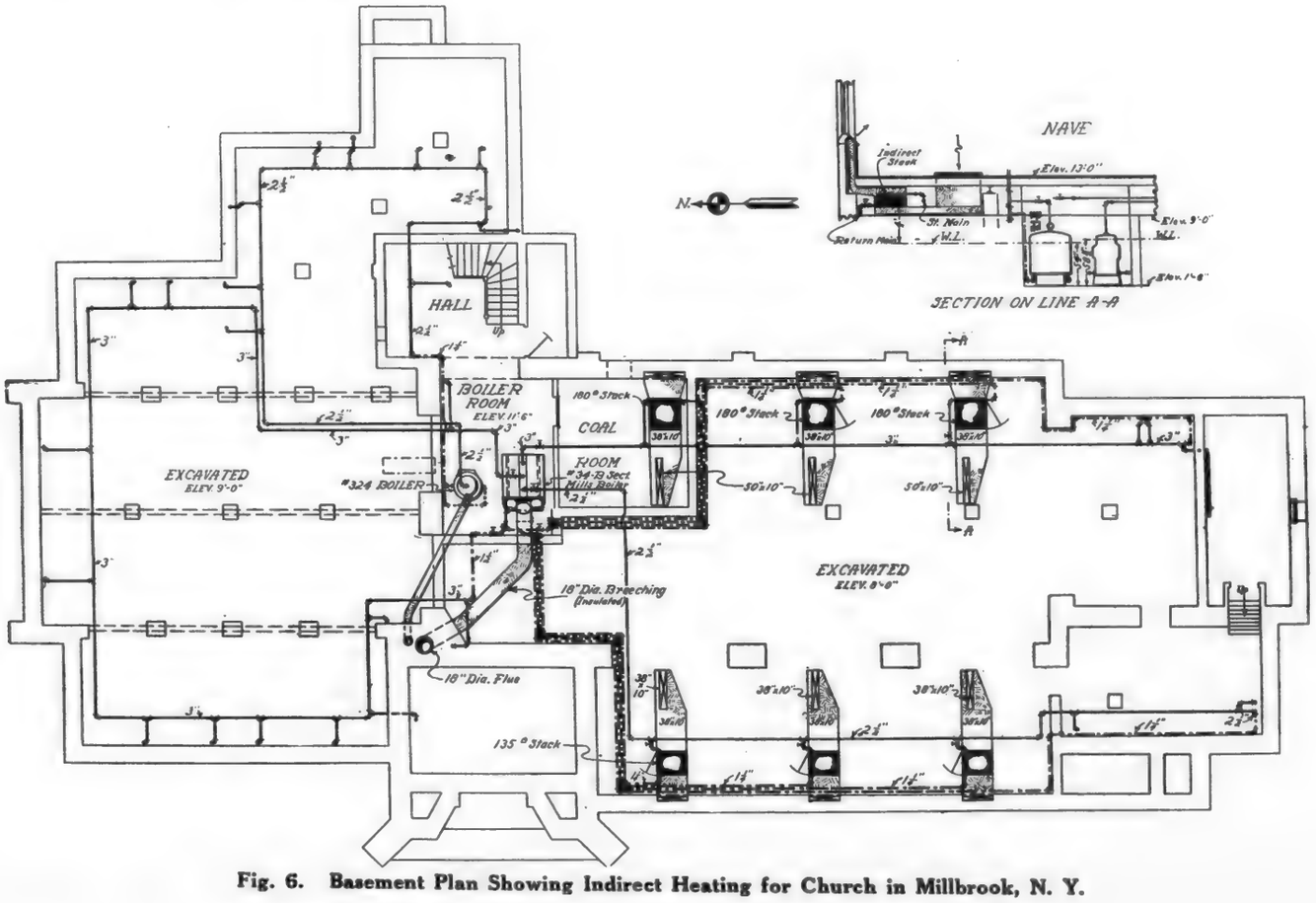


Fig. 6. Basement Plan Showing Indirect Heating for Church in Millbrook, N. Y.

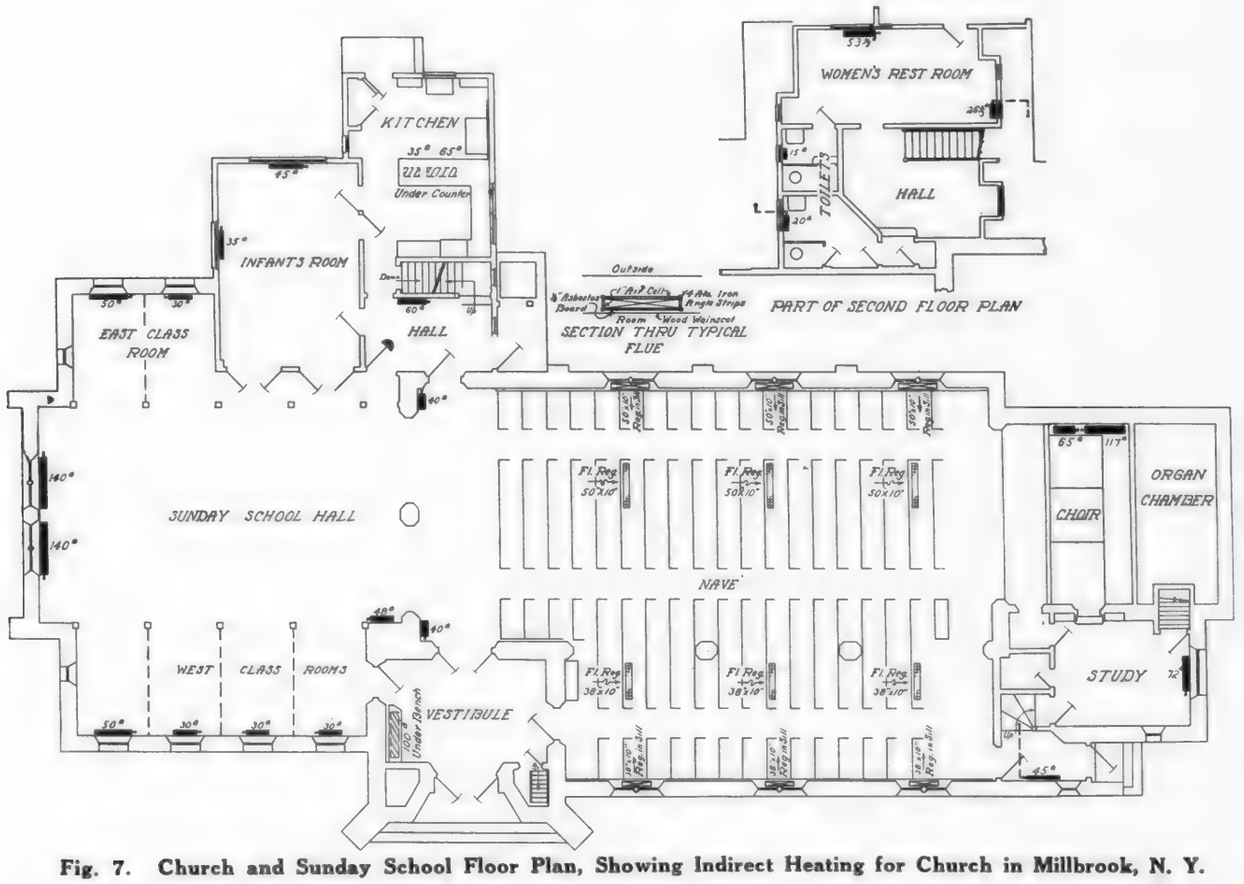


Fig. 7. Church and Sunday School Floor Plan, Showing Indirect Heating for Church in Millbrook, N. Y.

lower than a steam or water heating system, although the cost of operation would be higher, especially if the air is taken from outdoors. During the week, if the heating is stopped, there is no danger of the heating system freezing. It also permits quick reheating, especially if provision is made for recirculating the air.

In a gravity warm-air furnace heating system the distribution of the heat, as a rule, is not uniform, generally due to the incorrect location of registers. The heat distribution in a system of this type is also affected by wind conditions. In a system of this character gravity vents must be provided for removing the air.

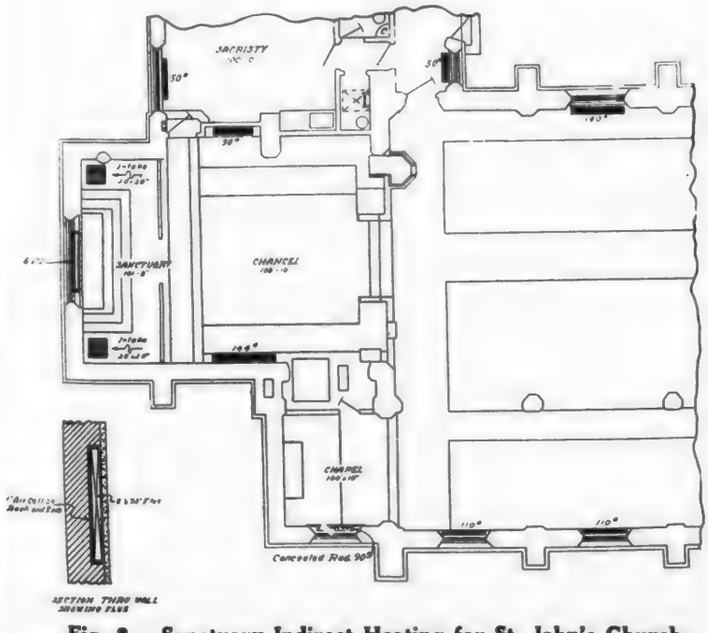


Fig. 8. Sanctuary Indirect Heating for St. John's Church, Buffalo, N. Y.

HEATING BY RADIATORS

Heating by radiation may be done either by hot water or by steam, the latter being preferable, due to more convenient shutting off of parts of the system for short periods of time and quicker reheating.

The arrangement of the heating system for a small church having a Sunday school under the auditorium is illustrated by Figs. 1, 2, and 3, of the Immanuel Lutheran Church at Whitestone, N. Y. The heating system installed is a one-pipe steam system. The church proper and rooms in connection with same are heated by radiators located under the windows.

The steam mains are located on the ceiling of the Sunday school room close to the outside wall and are concealed in a false beam effect. The drip main is carried concealed under the basement floor back to the boiler.

The Sunday School Room is heated by wall radiators hung under the windows. Concealed vertical connections are run between the steam mains and drip mains. These act both as supply risers to the basement radiators and as drips for the steam mains.

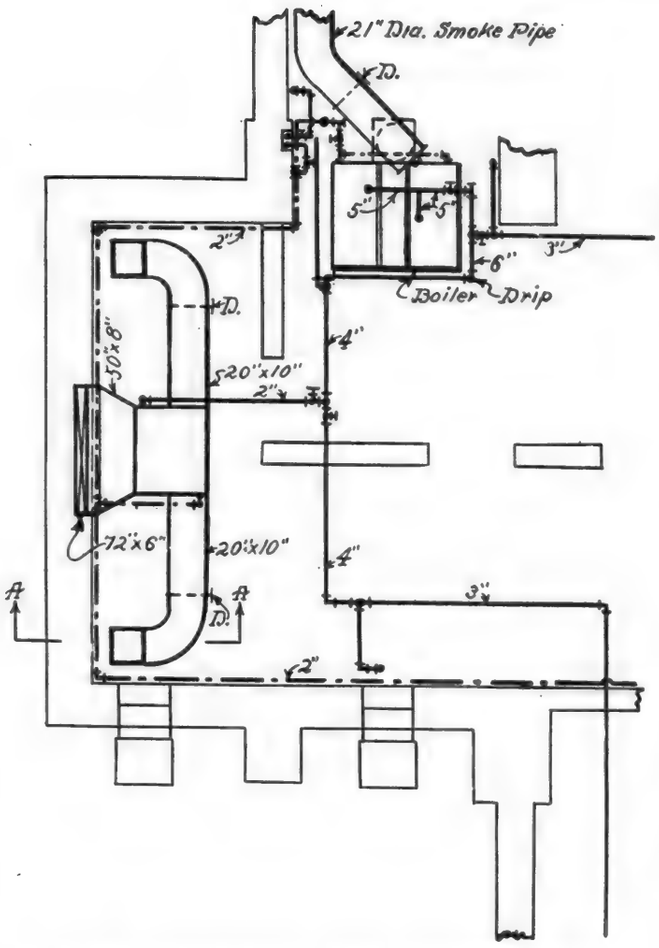


Fig. 9. Basement Plan of Ducts for Indirect Heating of Sanctuary, St. John's Church, Buffalo, N. Y.

Another method of heating a Sunday School room located under the church proper is shown in Fig. 4. This is the method used in the Sunday School of Christ Church, Bronxville, N. Y. This building has a vacuum steam heating system, steam being supplied from an outside source. The overhead steam mains are dripped through double service valves, through the basement radiators into the return main. These double service valves act as both control valve and trap for drip.

In place of the double service valve, the vertical steam connection can be extended and dripped through a trap direct into the return main. In this case, the valve on the radiator would only be a control valve.

In the heating systems of the two churches just described, aisles are located along the outside walls, permitting the radiators to be located under the windows. In cases, where pews are located along the outside walls, and radiators are installed there, enclosures should be provided to protect the occupants sitting near the radiators against the radiant heat. Such an arrangement is illustrated by Fig. 5, showing the radiator enclosures provided in St. Luke's Church, New York City. In this building, the radiators are located along the outside walls under the windows, the pews abutting them.

INDIRECT HEATING

In the nave of a Church at Millbrook, N. Y., illustrated by Figs. 6 and 7 the pews are located along the outside walls. Due to certain conditions, it was impossible to install radiators under the windows. It was proposed to heat the auditorium proper by indirect stacks, the air being recirculated. The air to the indirect stacks is taken in through floor registers, located under the pews and slightly raised above the main floor to prevent sweeping into them. The heated air flues from the stacks are carried concealed in the wall under the window and discharge at the sill level. This arrangement is shown in the small detail, Fig. 6.

The heating system proposed is steam, the church proper and the Sunday School being heated from one boiler, while the kitchen and social rooms are heated from another boiler. Either section of the building, therefore, could be heated at will.

SPECIAL TREATMENT OF SANCTUARY

The heating of the sanctuary sometimes presents unusual conditions, due to the sacred use to which this part of the church is put and the beauty that is desired there.

If the altar is so arranged that there is a space behind it, radiators may be placed there. Radiators may sometimes be concealed in adjacent walls.

In St. John's Church, Buffalo, N. Y., the altar is against the wall, there being no place available in the sanctuary for radiators. Figs. 8 and 9 show the arrangement of the heating used in this case. The air from the church is taken in through two floor registers located on each side of the altar, passes through an indirect stack and is discharged through a slot located in the sill of the window over the altar. An elevation of this scheme at *a-a* is shown in Fig. 10.

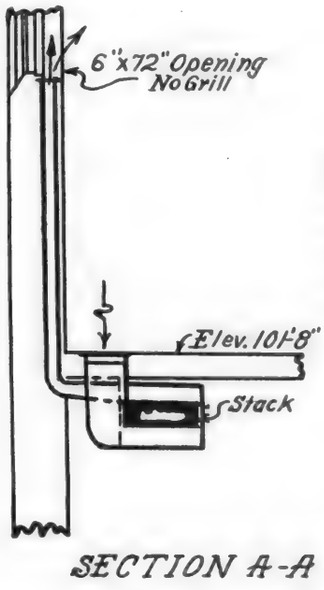
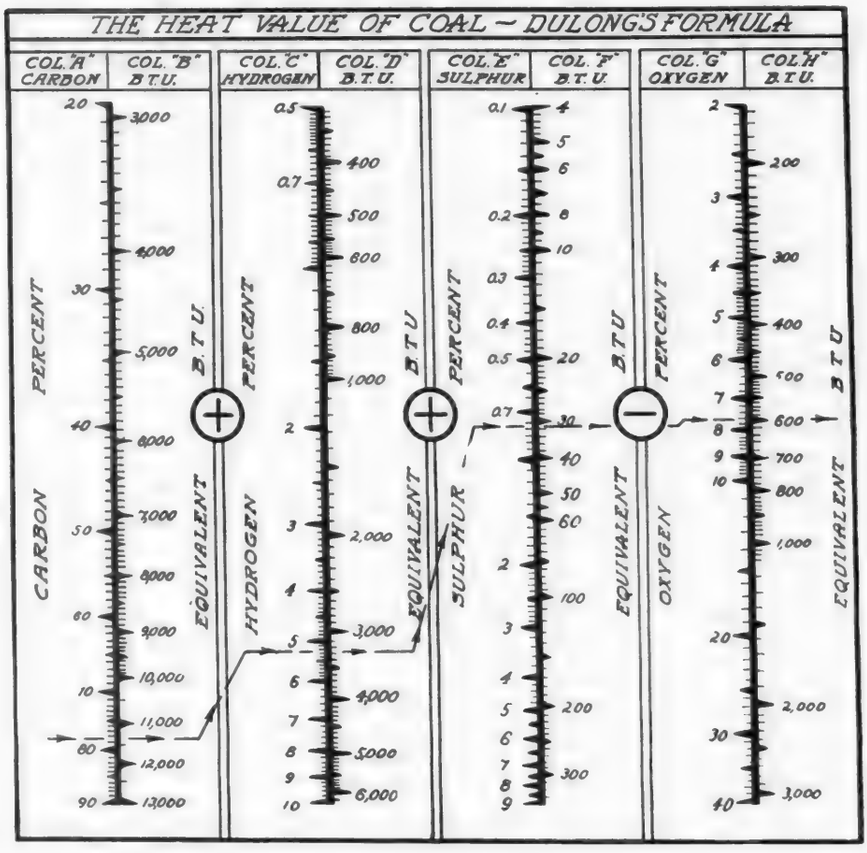


Fig. 10. Elevation Showing Indirect Heating Scheme for Sanctuary in St. John's Church, Buffalo, N. Y.

In subsequent issues, Mr. Offner will discuss the heating and ventilation of larger churches, with special reference to fan systems.

Chart for Determining Heat Value of Coal from Chemical Percentages



A CHART which makes the calculation of the B.T.U. value of any coal possible with the minimum expenditure of effort, if the percentage of carbon, hydrogen, sulphur and oxygen are known, has been evolved by W. F. Schaphorst, M.E., of Newark, N. J. It does away with all vexatious multiplying and dividing, making simple addition and subtraction the only operations necessary to perform.

For example, suppose coal is selected, the analysis of which shows 78.76% of carbon, 5.23% hydrogen, 0.78% sulphur and 7.61% oxygen. To apply the chart to this particular case, it is necessary to find, in Column "A", the 78.76% of carbon and, on the opposite side of the heavy line, in column "B", will be found the amount, 11,300, which represents the equivalent B.T.U.

To make the matter clearer, a dash line is shown on the chart to indicate the method of following across to column "H". This 11,300 is set down in a column and the next step is to find in column "C" the hydrogen percentage of 5.23, while on the opposite side of the heavy line, in column "D", it is found that this is equivalent to 3250. The dash line indicates this position on the chart and the 3250 should be set down under the 11,300 already obtained from column "B", ready for addition.

> ***Simply add the equivalents in Columns B, D, and E for the percentages of carbon, hydrogen and sulphur and from this sum subtract the equivalent in Column H for the percentage of oxygen. The remainder is the value of the coal in B. T. U.***

Then, taking the 0.78% of sulphur, it is necessary to locate this in column "E" and reading on the opposite side of the heavy line, in column "F", it is found that this is equal to 31, which should also be set down under the two other amounts and added thereto, giving—

```
11,300
 3,250
    31
-------
14,581  Total.
```

The oxygen, however, must be subtracted from this total of 14,581 and so it is required to look for the 7.61% of oxygen in the oxygen column (column "G") and refer across the heavy line to column "H," finding the equivalent is about 595. This must be subtracted from the previous total, thus:

```
11,300
 3,250
    31
-------
14,581
less  595
-------
13,986  heat value of the coal.
```

To summarize the whole process, add the carbon, hydrogen and sulphur equivalents and subtract the oxygen equivalent.

This chart is based on Dulong's well-known formula, which is said to give results that are accurate to within one-half of 1% of most coals that are dry. The formula, as usually written, takes the form of B.T.U. per pound = 14,544 C + 62,028 [(H — 0/8)] + 4050 S.

In arranging the chart, the formula has been slightly altered in the follow-manner:
14,544 "C" + 62,028 "H" +4050 "S" — 7753 "O" = B.T.U. per pound of coal.

The plus signs between columns clearly indicate the addition to be carried out between columns "B," "D" and "F", while the minus sign, shown between columns "F" and "H", indicates that the amounts obtained in column "H" must be subtracted from the sum of the other three.

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IT was just a year ago this month that THE HEATING AND VENTILATING MAGAZINE published the first details to appear in the engineering press of the sensational resolutions adopted by the American Public Health Association condemning mechanical ventilation for school buildings and coming out in favor of the open-window method. At the time we were gently chided by being classed among the "popularity-loving journals" for giving publicity to the action of the public health officials. It was not long, however, before the industry realized that it was face to face with an ominous situation fraught with dangerous possibilities. At the annual meeting of the American Society of Heating and Ventilating Engineers in Buffalo last January, and, later, at the society's summer meeting in Lexington, Ky., the challenge of the open-window advocates was accepted and met in a way that not only indicated the importance attached to the subject by the leaders of the industry, but which brought out to their entire satisfaction the inherent fallacy of any scheme of open-window ventilation which lacked the vital element of control. The net result, however, was very much like the experience of the youngster who was told, as he backed away from a vicious-looking dog, that the animal would not bite him. "You know it and I know it," he exclaimed, "but the question is, does the dog know it?" In other words, those responsible for the mechanical equipment of public school buildings had yet to be convinced that the open window was not the solution of their ventilating troubles.

AS matters stand to-day the subject is as live an issue as it ever was and it is very apparent that only the most practical sort of evidence is going to have any weight in controverting the firm convictions of the open-window advocates. Fortunately, such evidence is at hand. Commencing with this issue, THE HEATING AND VENTILATING MAGAZINE will have the privilege of laying before its readers facts and figures which should go far towards settling the question. The evidence will be in the form of two series of articles, one by Edwin S. Hallett, chief engineer of the St. Louis Board of Education, detailing the problems of school ventilation in that city, and the other by Jay R. McColl, who designed the ventilating equipment for some of the latest school buildings to be erected in Detroit.

In speaking of the types of equipment adopted in these two cities, we have it on the authority of a leading ventilating engineer that, "based on observations of many schools in many cities, the systems of heating and ventilation as installed in the schools of St. Louis and Detroit are far superior to anything else anywhere in the country and the surprising feature of the whole matter is that these systems cost less to install than those in any other city I know of, while the cost of operation is surprisingly low."

The first article, by Mr. Hallett, appears in this issue and will be followed, at an early date, by the first article of Mr. McColl's series.

NEWS of the mass meeting of engineers in New York City for the purpose of effecting a strong labor union of technical men comes as something of a jar to those who have considered the professional field outside of the realm of organized labor. Be that as it may, the fact remains that some 1000 engineers, mostly, it is true, employed in the various engineering departments of the city, attended the meeting and took membership almost to a man in the organization. As one of those present expressed it, the technical men of to-day, at least those in the city departments, have been caught between the promoters of the great municipal undertakings and the mechanics on the job, with the result that their interests seem to have been largely overlooked.

When it is considered that graduates of technical schools employed in city departments are being paid as little as $22.00 per week and that a salary of $2200 a year is considered a fair average salary, it is not hard to visualize the straits to which these men have been driven and to feel a degree of sympathy for them in their determination to take even this means to better their condition.

Status of Heating Ordinances in New York and Chicago

AS another heating season is now well under way, the present furnishes an opportune moment to offer encouragement to the thousands who rent offices, shops or homes in which heat is included as an item to be furnished by the owner or landlord.

Gross abuses of the amount of heat furnished under such arrangements are altogether too common and in many cases seem to be limited only by what the tenant will stand for and what the owner can get away with.

Requirements, as called for in New York, while exacting, are not nearly as severe as those of Chicago, but the very fact that two of the largest cities in the country have taken up this question and have provided something in the way of legal relief, is encouraging.

THE NEW YORK ORDINANCE

The New York requirements are contained in Section 225, Chapter 20, Article 12, Code of Ordinances, City of New York and read as follows:

"*Sec. 225. Heating of Occupied Buildings.* It shall be the duty of every person who shall have contracted or undertaken, or shall be bound, to heat, or to furnish heat for any building, or portion thereof, occupied as a home or place of residence of one or more persons, or as a business establishment where one or more persons are employed, to heat, or to furnish heat for every occupied room in such building, or portion thereof, so that a minimum temperature of 68° F. may be maintained therein at all such times. Provided, however, the provisions of this section shall not apply to buildings, or portions thereof, used and occupied for trades, businesses, or occupations where high or low temperatures are essential and unavoidable.

"For the purpose of this section, wherever a building is heated by means of a furnace, boiler, or other apparatus under the control of the owner, agent, or lessee of such building, such owner, agent, or lessee, in the absence of a contract or agreement to the contrary, shall be deemed to have contracted, undertaken, or bound himself or herself to furnish heat in accordance with the provisions of this section.

"The term 'at all such times' as used in this section, unless otherwise provided by a contract or agreement, shall include the time between the hours of 6 A.M. and 10 P.M. in a building, or portion thereof, occupied as a home or place of residence, and during the usual working hours established and maintained in a building, or portion thereof, occupied as a business establishment, of each day whenever the outer or street temperature shall fall below 50° F.

"The term 'contract' as used in this section shall be taken to mean and include a written or verbal contract. (As adopted by the Board of Health Oct. 17, 1918, and amended Dec. 11, 1919.)"

The Department of Health is charged with the enforcement of the foregoing provision of the Sanitary Code. Complaints should be addressed to the Commissioner of Health, Dr. Louis I. Harris, Department of Health, 505 Pearl Street. It will then become his duty to send an inspector to investigate the facts and take appropriate action to secure compliance with the law.

THE CHICAGO ORDINANCE

The Chicago legislation is embodied in Sections 2119, 2120, 2122 of Sections 1, 2 and 3, Chicago Municipal Code of 1922, which have been repealed and for which the following have been substituted.

2119. Required Temperature—Complaints. It shall be the duty of every person, firm or corporation owning or controlling the heating plant which furnishes heat to any tenement house, hotel, lodging house, rooming house or boarding house, as defined by the ordinances of the city, in which the heat is furnished from a heating plant used in common for the purpose of heating the various rooms and apartments therein and such heating plant is under the control or supervision of such owner or person in control of such building, to furnish heat to such rooms and apartments, from October first of each year to June first of the succeeding year, so that the occupants thereof may secure without such undue restriction of ventilation as to interfere with proper sanitary conditions, a minimum temperature of 60° F. at 6:30 A.M., 65° at 7:30 A.M., and 68° at 8:30 A.M. and thereafter until 10:30 P.M., averaged throughout the apartment; provided that written notice of complaint concerning lack of heat in such room or apartment shall first be given to such person, firm or corporation by registered mail before a violation of this section shall be deemed to exist.

2120. Method of Determining Temperature. For the purpose of determining whether or not the temperature in any such room or apartment is in accordance with the provisions of the preceding section, temperature readings shall be made only by an inspector of the Department of Health by means of a standard Fahrenheit thermometer approved by the Department of Health in not less than two separate rooms in such apartment, or if the apartment consists of only one room, in two opposite parts of the room, as near the extremes as practicable, such thermometer to be placed at a point not less than 4 ft. nor more than 6 ft. away from any door or window leading to the outer air. Failure to furnish the heat required in the preceding section shall not constitute an offense where it is due to a breakdown of the heating plant, if diligence is used to have such plant repaired (unless such breakdown has been caused by the violation of an existing ordinance relating to the operation of heating plants), nor where it is due to strikes, to general shortage of fuel, to any act of the tenant who makes the complaint, or to any cause beyond the owner's control, unless written notice of such failure to furnish the heat required shall first have been given to the owner or agent of the building by registered mail, and the temperature readings herein provided for shall not be made until after the delivery of such registered letter to the addressee thereof.

2122. Penalty. Any person, firm or corporation owning or controlling a tenement house, hotel, lodging house, rooming house or boarding house, as defined by the ordinances of the city, in which the heat is furnished as described in Section 2119, or owning or controlling the heating plant which furnishes heat to any factory, workshop, office, store, or other place of employment, as described in Sections 2121 and 2121a, that violates any of the provisions of this article or neglects or refuses to comply therewith, shall upon conviction thereof, be fined not less than twenty-five dollars nor more than two hundred dollars for each offense, and a separate offense shall be deemed to have been committed each day that a violation of this article continues; provided, that no more than one fine shall be imposed for violations in the same building occurring on any one day.

2121a. Required Temperatures in Offices, Stores, and Places of Employment. It shall be the duty of any person, firm or corporation owning or controlling the heating plant which furnishes heat to any office, store or other place of employment, to maintain a temperature within such office, store or place of employment of not less than 68° F. without such undue restriction of ventilation as to interfere with proper sanitary conditions therein; between the hours of 8:00 A.M. and 6:00 P.M., from October first of each year to June first of the succeeding year, Sundays and full legal holidays excepted.

Building Dedicated to Heating and Ventilating Profession

The Heating and Ventilating Building, 2714 South Hill St., Los Angeles, Cal., is a building erected for and dedicated to the heating and ventilating profession. It is occupied by the Heating and Piping Contractors Association and manufacturers and representatives of high-class heating material.

It is believed that this is the first building which has ever been dedicated entirely to the heating and ventilating profession.

Correspondence

Conducted by T. W. Reynolds

Strong Arguments Against Window Ventilation Weakened by Careless Comparison

EDITOR HEATING AND VENTILATING MAGAZINE:

In the discussion of tne comparative merits of mechanical and so-called open-window ventilation, it is important to keep clearly in mind just what is the scheme proposed by the open-window advocates.

Opponents of a proposition do not make their cases any stronger by failing to consider all the facts they are trying to argue against. The strongest argument can always be presented by allowing the opposition every point and advantage to which it is entitled and then proving by sound logic and irrefutable reasoning that the results obtained, after conceding everything which is due, are still inferior to those secured by other means.

For instance, in one recent comment on the open-window scheme*, a design was shown (illustrated in Fig. 1) and the statement was made that:

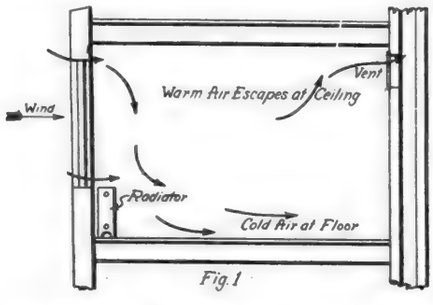


Fig. 1

Conditions in Room with Cold Radiator

"If the window is opened and is on the windward side, giving a condition which the American Public Health Association suggests can be obtained by providing 'gravity flues,' cold air will enter, finding its way to the floor around my body, eventually chilling the floor and giving me cold feet." (See Fig. 1).

The illustration is presumed to cover the action of window ventilation when the radiator is cold or when no radiator is used, for the writer immediately goes on to say:

"If a radiator is placed below the window, it will warm the air around it, causing a fountain-like jet of warm air to rise above it, while the current of air to replace that which rises causes another cool draft around my feet." (See Fig. 2).

From this it is indicated that Fig. 2 is the same room under the same scheme, but with a heated radiator set under the window sill so as to produce what the author seems to be under the impression is window ventilation as now advocated.

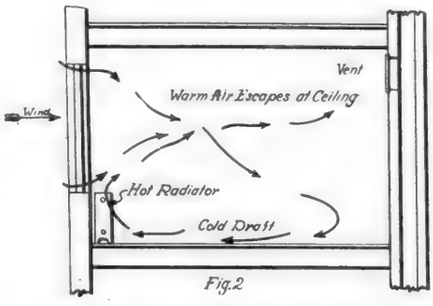


Fig. 2

Conditions in Room with Hot Radiator

In Fig. 3 is presented a third view of the same room with a hot radiator, but with the arrows showing the reversed air movement when the room is on the lee side of the building.

Now the most ardent window-ventilation enthusiast has never gone to the extent of supposing that radiators could be eliminated or even left cold when the room is under the desired temperature, while if the room is over temperature the incoming cool air will rectify the matter in a very short time.

One of the fundamental ideas in window ventilation is the use of graduated control on the radiators, which means vapor or vacuum steam or possibly hot water. This permits graduating the heat emitted by the radiator from a maximum, on an extremely cold day, down to a minimum amount of heat on a very mild day. Radiators fed from one pipe or two-pipe gravity steam systems and requiring a positive 100% *on* or *off* condition at all times can readily be conceived as being not the best type on which to test window ventilation.

If the radiators shown in the Figs. 1, 2 and 3 are assumed to be 38 in. high, the width is about 10 in., whereas if they are taken as 26 in. height, the width shows about 8 in. In the first instance, this would be equal to a 3-col. and in the second instance to a 2-col. radiator. Yet all the window ventilation advocates know that, owing to the large amount of heat concentrated under the windows, it is desirable to spread the radiation as much as possible, at the same time providing the most desirable style of radiator, either the single column or wall type.

Another very essential attribute of window ventilation is the deflector

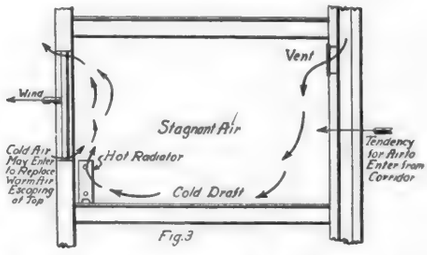


Fig. 3

Room with Ventilation Reversed by the Wind

board placed at the bottom of the window for the very purpose of shooting the cold air toward the ceiling, so that it will have an opportunity to mix with the warm air rising from the radiator at the same time, the two columns mixing and diffusing at the ceiling and dropping down to the breathing line in a mild and tempered condition.

It will be noted that in Figs. 1, 2 and 3, no such deflectors have been shown and that if they had been properly indicated, the arrow showing the air flow directed horizontally across the very top of the radiator (Fig. 1) indicates a mechanical impossibility, while the arrow shown just above the top of the radiator (Fig. 2) would have been directed toward the ceiling at its tip and even Fig. 3 would show cold air coming in at the bottom and going almost directly up the face of the glass, passing out again at the top.

SALIENT FEATURES OF "OPEN-WINDOW" VENTILATION

In Fig. 4 is shown what is open-window ventilation as now being advocated by so many health officials, em-

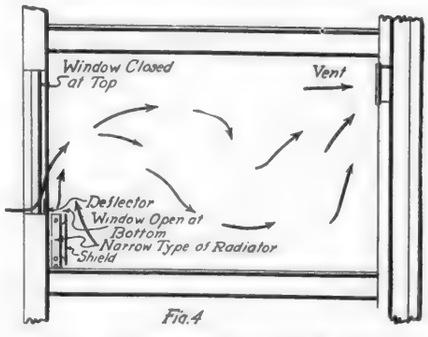


Fig. 4

Room with N.Y.S.C. on V. Requirements Fulfilled

bodying long, thin radiators, deflectors in front of openings, shields in front of radiators, high exhaust registers on the rear wall and windows open at bottom

*Samuel R. Lewis in "Domestic Engineering" for July 31, 1926.

only, while the radiators have graduated control and are with or without thermostatic control as desired.

Two other points on which the first three diagrams do not conform to the requirements of present practice in window ventilation are the absence of heat shields on the fronts of the radiators to protect nearby pupils from excessive radiant heat and the matter of opening the windows at the top, which is contrary to the recommendations of the experimenters on this subject. If teachers do so open windows at the top, in spite of their instructions, then it is hardly the fault of the system inasmuch as the top sash could be fixed in permanent position.

Some very good points are brought out by the same writer regarding the limitation of open-window ventilation, such as reversed air flow, lack of control and offensive odors. It is easy, however, to weaken argument against the whole scheme by not using an accepted window ventilation system as a basis for comparison.

R. L. B.

An Off-And-On, Up-And-Down Water Heating System

EDITOR HEATING AND VENTILATING MAGAZINE:

There is some difficulty in the circulation of the water heating system as sketched. The system when tested first circulated water at a temperature of 200°, which temperature rose to 210° in about seven minutes, then three minutes later suddenly dropped to 180°., continuing to drop until in five minutes it had lowered to 175°. The cycle would then be repeated, the temperature again rising to 210° or 220° ., then dropping as before to about 175°. The cause of the trouble seems to be a mystery and a new one to me, though I have laid out many similar heating systems. The only solution that comes to mind is the possibility of a stoppage.

Glen Ridge, N. J. A. N. H.

The system is evidently air-bound at some point in the lower portion. Whenever the pressure differential between the hot water in the supply risers and cold water in the return risers becomes great enough by heating, the air is dislodged and forced around the system. The hot water as then distributed throughout the radiators would soon cool and reheating to the higher temperature would again be necessary in order to establish another period of temporary heating.

Possibly another contributing cause of the difficulty is the repetition of the up-and-down columns of water,—water in "D" column must be cooler than that in "C", likewise water in "B" column cooler than the water in "A" before circulation will be established throughout the system. The higher the temperature difference between columns "C" and "D" the better the circulation and this would be whenever water at the highest temperature stated reached the radiators. But with the radiators thoroughly heated the temperature of the water in the column "D" would rise, causing the circulation to slow up and await a repetition of the cycle.

The expansion pipe is much too small to insure a prompt liberation of the air at the high point. It should be connected from the top of column "A" and run direct to the tank, extending the main riser full size for a short distance so as to form a chamber or catch point for air which might otherwise be carried around the system.

Go over the grading of the horizontal pipes in the basement, but if these are inaccessible, in part, install a pet cock at "E" and note if air is discharged when the cock is opened. Whenever the system is drained open all radiator air cocks at the high points and see that the piping is thoroughly drained, especially in the low portion, or wherever graded poorly, otherwise, when refilled, air may be caught between new water entering the system and that still remaining at some point or other.

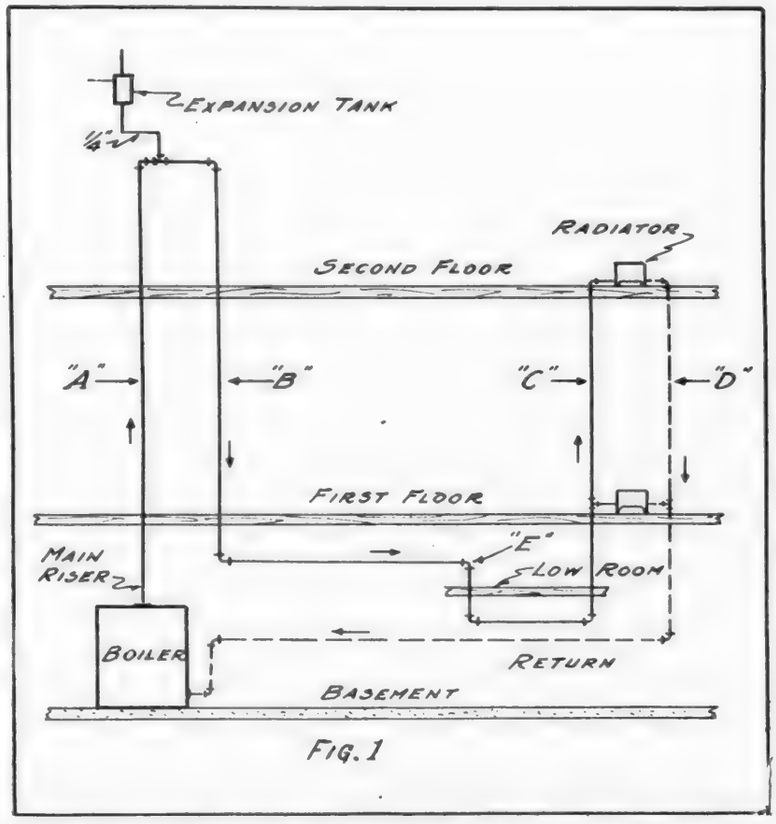


FIG. 1

Sketch of Off-and-On, Up-and-Down Water Heating System

Effect of Air Infiltration Through Walls in Figuring Radiation

EDITOR HEATING AND VENTILATING MAGAZINE:

The reply, in the current number of your magazine, to my letter which was published in the September number, is mainly a recapitulation of what appeared in your February issue and entirely evades the principal point to which I called attention, namely, the fact that leakage through walls does exist, that it has a recognized and potent influence on "heat losses" and that it is given no consideration whatever in the tables issued by the Heating and Piping Contractors National Association.

In order to check up the reliability of these tables, I suggest that some actual examples be noted of rooms, in different cities, the radiation in which has been found sufficient to maintain a temperature of 70° F. (but not more) with the "guarantee" outside temperature, and compare it with the amount of radiation called for by the tables.

A room in this building, for instance, has 46 sq. ft. of glass (window opening) and 46 sq. ft. of outside wall (20-in. brick, furred and plastered) and 34 lin. ft. of window cracks, north exposure. The window is double-hung, of heavy plate glass and has metal strips. According to the "Boston Table," as I figure it, this calls for something less than 25 sq. ft. of 3-col. 38-in. radiation. The actual radiator in this room is 13-section, 2-col. 26-in., 34 2/3 sq. ft. This is not the least bit too large, when "steam hot" throughout, to maintain a temperature of 70° F. in zero weather. It is very obvious that a 25-sq. ft. radiator would be entirely inadequate.

Perhaps some of your readers would be enough interested to furnish other examples.

Boston, Mass. PERCY N. KENWAY.

Heat Transmission Through Hollow Building Blocks

EDITOR HEATING AND VENTILATING MAGAZINE:

What is the heat loss through walls built of concrete block construction,

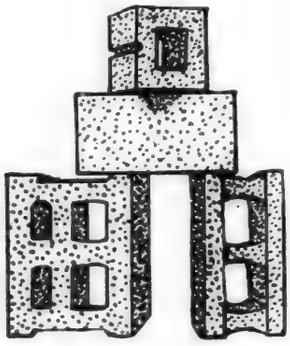


Illustration Submitted by Correspondent

such as are shown on the enclosed illustration?

Cincinnati, O. R. H. C.

Data on heat transmission for the particular type of hollow concrete block submitted by our correspondent do not seem to be available, but doubtless the results of transmission tests on similar construction will be of interest. Such tests, as given hereafter, show the possibilities of greater insulation for the block under question by filling of the air spaces with materials of a poor conductivity and building of the walls with the webs of the blocks running horizontally, instead of vertically, as apparent in the sketch.

As a general rule, it is possible to compute the heat transmission through any material to a degree of accuracy closely approaching that obtained by test. Unfortunately, in the case in mind, the usual formula for compound walls and air spaces does not give results which may be judged as reasonable, especially when compared with known data on hollow walls of various types. Surface coefficients for radiation and convection for both still and moving air conditions may be safely assumed and the conductivity of the material is known, likewise a proportionate amount of the block may be figured as a solid, but the conductivity through the solid portions introduces an uncertain factor of radiation from these parts to the webs and sides.

The heat conductivity of a material expressed in B.T.U. per day (24 hrs.) per square foot of surface per degree F. difference in temperature between the surfaces of the material is about equal to the density of the material expressed in pounds per cubic foot; in other words, the best insulations have the least density. This holds true for cinder concrete weighing as low as 80 lbs. per cubic foot up to stone concrete weighing 145 lbs. per cu. ft.

Ordinary brick work has a conductivity expressed in the above terms of about 120 B.T.U., or 0.42 B.T.U. per hour for a 12-in. wall, thus (120 ÷ 24) = 0.42. Ordinary kinds of lumber, such as yellow pine sheathing and drop siding, have a conductivity of 25 to 30 B.T.U. per day.

The tests previously referred to were conducted in 1913 at the University of Toronto on hollow blocks of concrete and tile, with results as detailed in the accompanying sketches and conclusions summarized as follows:

A brick wall is a better insulator than a hollow wall of similar thickness.

A clay hollow-tile wall is better than a concrete-hollow block wall.

A hollow wall built with the webs of the blocks running horizontally is better than one built with the same blocks having the webs vertical.

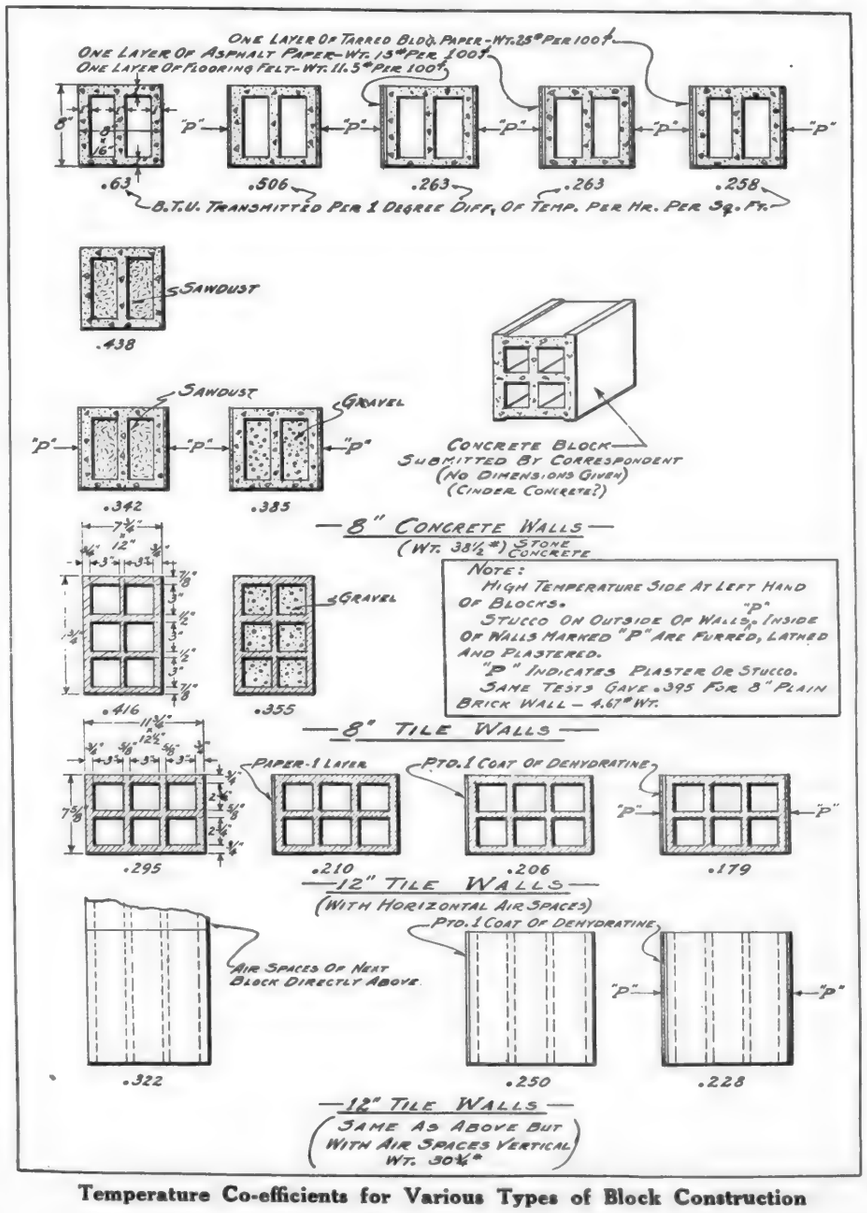
The heat losses through walls are reduced very considerably when the spaces are filled with a material which, when placed in the wall, forms a number of small air spaces separated from each other. For example, ordinary pit gravel has practically the same insulating value as mill shavings.

Tarred or asphalted felt, tarred or asphalted papers and heavy waterproof papers are of great value in reducing heat losses through walls.

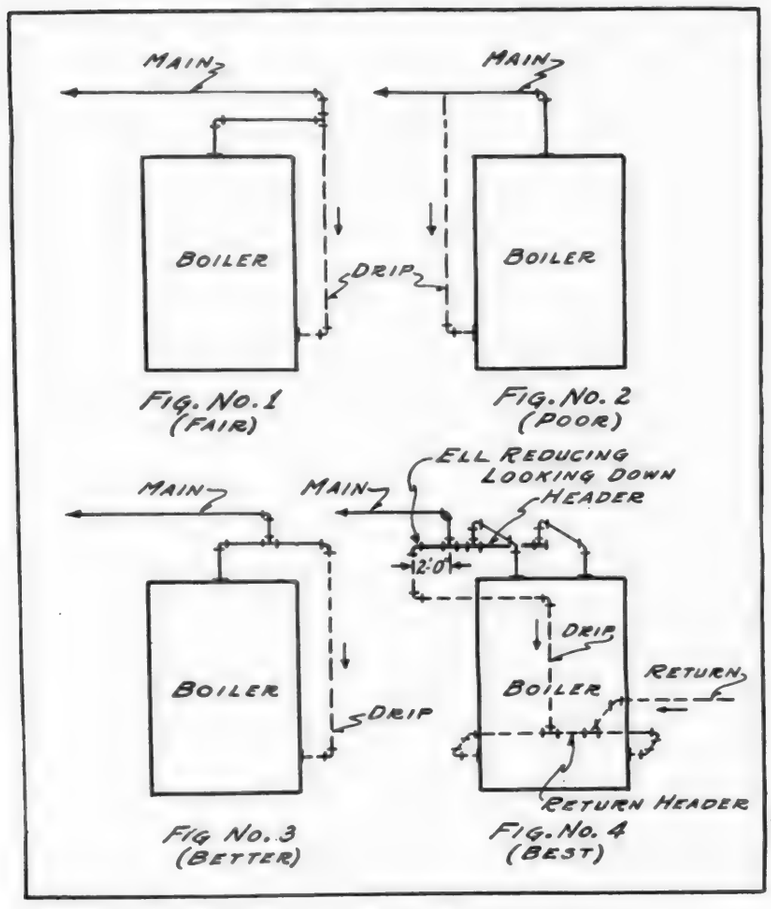
Equally good results are obtained by coating the walls with a good coat of a damp-proofing material which completely fills the pores and prevents air leakage.

Ordinary plaster, even three-coat work, has comparatively little practical value as an insulating material.

Air spaces greater than ¾-in. thickness give no additional value for heat insulating purposes.


ONE LAYER OF TARRED BLDG. PAPER - WT. 25# PER 100 ft.
ONE LAYER OF ASPHALT PAPER - WT. 13# PER 100 ft.
ONE LAYER OF FLOORING FELT - WT. 11.5# PER 100 ft.
8"
"P"
.63
.506
.263
.263
.258
B.T.U. TRANSMITTED PER 1 DEGREE DIFF. OF TEMP. PER HR. PER SQ. FT.
SAWDUST
.438
SAWDUST
GRAVEL
.342
.385
CONCRETE BLOCK SUBMITTED BY CORRESPONDENT (NO DIMENSIONS GIVEN) (CINDER CONCRETE?)
— 8" CONCRETE WALLS —
(WT. 38½#) STONE CONCRETE
NOTE:
HIGH TEMPERATURE SIDE AT LEFT HAND OF BLOCKS. "P"
STUCCO ON OUTSIDE OF WALLS, INSIDE OF WALLS MARKED "P" ARE FURRED, LATHED AND PLASTERED.
"P" INDICATES PLASTER OR STUCCO.
SAME TESTS GAVE .395 FOR 8" PLAIN BRICK WALL — 4.67# WT.
GRAVEL
.416
.355
— 8" TILE WALLS —
PAPER - 1 LAYER
PTD. 1 COAT OF DENYDRATINE
.295
.210
.206
.179
— 12" TILE WALLS —
(WITH HORIZONTAL AIR SPACES)
PTD. 1 COAT OF DENYDRATINE
AIR SPACES OF NEXT BLOCK DIRECTLY ABOVE
.322
.250
.228
— 12" TILE WALLS —
(SAME AS ABOVE BUT WITH AIR SPACES VERTICAL WT. 30¾#)

Temperature Co-efficients for Various Types of Block Construction



Sketch of Good and Bad Boiler Connections

Good and Bad Boiler Connections

EDITOR HEATING AND VENTILATING MAGAZINE:

As a fitter I am told that on large or medium-sized jobs one should bleed the header, but if a bleeder is a good thing to use on such jobs why isn't it just as good on small jobs? To my way of thinking Fig. 1 shows the only correct way to drip the header, not as shown in Fig. 2 or 3. Now who is right and who is wrong?

Waukegan, Ill. F. W. MEEKER.

The size of the heating system has nothing to do with the necessity for a drip. It is just as necessary on small as on large jobs. The purpose of the drip, when not used as an equalizer for two or more boilers, is to return the water to the boiler whenever it lifts due to priming or foaming, as often happens, and so prevent it from getting into the heating system.

Fig. 3 is the best of the three sketches submitted and Fig. 1 is better than Fig. 2. The arrangement shown in Fig. 3 is better than that shown in Fig. 1 because the velocity of the steam will direct the water in the same straight line to the drip point, whereas in Fig. 1 the steam and water must divide at right angles,—the steam strikes the tee fitting abruptly and it is quite apt to carry the water up with the flow of steam into the main. The proper or best way of all is shown in Fig. 4.

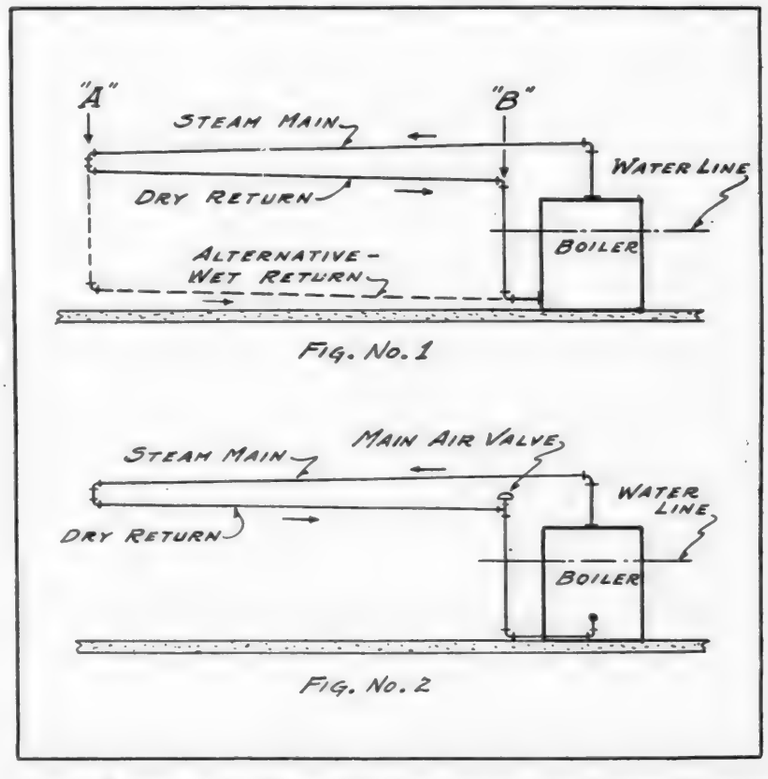
As shown in Fig. 4, use the full area of all outlets so as to decrease the velocity of steam, thus limiting the liability of lifting of water from the boiler. Run full size leads, rising from the boiler and then dropping into a large size header, for deposit of the water. Rise with the main or mains from the header and drip the header in the direction of steam flow where the water tends to go, maintaining the header full size to the drip point, which should be well past the point where the main takes off of the header.

Proper Point in Piping to Figure Distance above Water Line

EDITOR HEATING AND VENTILATING MAGAZINE:

I would like to know whether the distance which the return must be kept above boiler water-line is figured at point "A" or point "B" of Fig. 1. Also please tell me why a job which I made as shown in this sketch is not correct, as an engineer made me change it to the arrangement shown in Fig. 2. He claims that this is the proper way—down to the floor and up again.

Paterson, N. J. JOHN KNOWLES



Sketch Illustrating Point from Which to Figure Water-Line and Changes in Piping Correspondent was Forced to Make

The usual distance required above normal water-line of the boiler is figured from the lowest point of the piping, which is at "B", because of the main air valve customarily installed at this point. This is the point where the return drops wet, that is, to below the water-line. If the arrangement were such that the return dropped wet at point "A", as shown dotted in Fig. 1, then the required distance would be figured from "A".

Some air will get into the return even though there are air valves on the radiators, so that water should not be allowed to rise up into any portion of the dry return, thus preventing air from venting through the main air valve "B". Water hammer would also occur with water in the dry return.

There is no reason for dropping the return as indicated in Fig. 2, outside of some practical reason, such as obstructing a passageway; in fact, it is not a good thing to do this, as the pipe forms a depression for the deposit of mud. It is another matter if the entire return is dropped so as to form a wet return, as shown dotted in Fig. 1, as this not only provides a wet return, but also provides the boiler with the stored up water in the return. This is of advantage whenever the water-line in the boiler is suddenly lowered by heating demands, or because of water lifting out of the boiler and into the main.

The 1926-1927 Guide

The American Society of Heating and Ventilating Engineers Guide for 1926-1927 has been published, in enlarged and attractive form. The contents are basically the same as those of the Guide for 1925-1926, but considerable alteration is apparent even from a casual inspection. A continued healthy growth of this valuable reference book is to be noted, the present issue containing an increased number of pages divided, as shown in the following list:

	1925-1926 Issue. Pages	1926-1927 Issue. Pages
Heating Section	188	196
Ventilating Section...	76	100
Consulting Service Section	4	6
Catalog Data Section.	256	278
Total	524	580
Roll of Membership..	52	56
	576	636

Additions to the heating section consist of a list of standard heating and ventilating symbols, a revision of the pipe diagrams for various types of heating systems (as given on Page 54) and Tables 54A and 54B which have been added to the chapter on "Water Supply Systems and Piping" on Pages 101 and 102, as well as the addition of Building Insulation" and "Roof Insulation" to Chapter XIV. Chapter XI on Oil Fuel has also been altered considerably.

In the Part II under "Ventilation" changes will be found in the charts and tables included in Chapter XVII and entitled "How Temperature, Humidity and Air Motion Affect Human Comfort." Chapter VIII on "Systems of Ventilation" has been extended to cover the five methods of fan application and the amount of heat to be supplied to recirculated air under varying conditions, as are illustrated in the diagrams on Page 230.

Chapter XXI on "Air Conditioning and Cooling" has been entirely rewritten and Chapter XXII on "Drying" is a new chapter altogether, as also are Chapter XXIII, covering "Ozone in Ventilation", and Chapter XXV, entitled "Mechanical Draft."

Taken as a whole, the book is a most creditable one and should make a valuable addition to any engineering library. The only suggestion that might be offered is that the new edition could have been made of greater interest by a revamping and bringing up-to-date of even more of the material published in previous issues instead of simply reprinting it in the old form and familiar appearance.

In general appearance The Guide is similar to previous editions, being bound in blue cloth and stamped in red and gold. The size is 6 x 9 in.

All of the work was carried out under the direction of Perry West, consulting engineer, Newark, N. J., and his committee, consisting of Professor A. R. Acheson, Syracuse University, Syracuse, N. Y.; J. E. Bolling, consulting engineer, East Orange, N. J.; L. A. Harding, consulting engineer, Buffalo, N. Y.; C. V. Haynes, New York; Dr. E. V. Hill, Chicago; S. R. Lewis, consulting engineer, Chicago; Dr. W. J. McConnell, Philadelphia; C. L. Riley, New York; Professor A. C. Willard, Head of Department of Mechanical Engineering, University of Illinois, Urbana, Ill.; and Professor C. P. Yaglou, Harvard School of Public Health, Boston 17, Mass.

THE METRIC ADVANCE is the title of a booklet being circulated by Aubrey Drury, director, All-America Standards Council, and is designed to stimulate the movement for federal legislation for the adoption of the metric system. As is well known, the United States is practically the only nation in the world standing against the remarkable advance that has been made in the adoption of the metric system since 1790. Under the paragraph headed, "Education," is found the interesting statement that: "The opinion of educators and of those whose children are in school is summed up in the unanimous resolution of the National Congress of Mothers and Parent-Teachers' Association (600,000 members), which declares that use of the metric units will mean a saving of at least one school year in the life of each of the 22,000,000 school children in the United States and that this will insure the monetary saving of more than $800,000,000 annually in education."

It is truly an interesting aid, when we find that by adopting such a simplified standard, approximately $1,000,000 can be saved each year in educational work. The bulletin presents an interesting compilation of data on the desirability of adopting the metric system in the United States and from a perusal of the list of organizations and individuals who have signed petitions calling for action on this measure, it would appear that obstruction is provided by a very small minority.

Christmas Seals

An enterprise which has developed in twenty years from a $3000 proposition to one involving $5,000,000 shows the rapid growth and interest taken by the public in the Christmas seal method of raising funds for the fighting of tuberculosis, as adopted by the national, state and local tuberculosis associations of the United States.

Design for 1926 Christmas Seal

The seal, which has become almost as well known as the universal stamp, has a design for 1926, as shown in the reproduction herewith, which consists of three minstrels, two of whom are playing and one holding the shield, these portraying the old custom of Christmas carols.

G. A. SACCHI, manager of the stoker sales department of the Westinghouse Electric and Manufacturing Company, died November 4 at his home in Lansdowne, Pa.

Mr. Sacchi began his career with Westinghouse, Church, Kerr and Company, later was with the Westinghouse Machine Company and in 1909 took charge of the sales of stokers in the New York territory. In 1926, he was elected president of the Stoker Manufacturers Association, which honor he held at the time of his death.

American Society of Heating and Ventilating Engineers

Have You Arranged to Go to St. Louis?

St. Louis will extend a warm welcome to the members of the American Society of Heating and Ventilating Engineers attending their annual meeting, January 26-28, 1927, to be held at the Hotel Statler, in that city. President E. B. Langenberg, of the St. Louis Chapter, has already announced the appointment of the following committees to handle this meeting: Finance, V. D. Rossman, chairman; Program and Publicity, William C. Sodemann, chairman; Entertainment, R. K. Milward, chairman; Hotel, A. E. Humphreys, chairman; Transportation, E. A. White, chairman; Automobile, C. A. Pickett, chairman; Ladies, Mrs. R. E. Graves, chairman.

Research Discussed by Cleveland Chapter

"The Research Program of the Society" was the subject of an address at the October meeting of the Cleveland Chapter, October 8. The speaker was Professor S. E. Dibble, past president of the society, professor of heating and ventilating at the Carnegie Institute of Technology, and a member of the A.S.H. & V.E. Research Committee. Professor Dibble's remarks consisted of a survey of the research program and centered on the Rochester school investigation.

A program committee for the coming year was also appointed by the president consisting of J. J. Mason, chairman; T. A. Weager and H. M. Nobis. The program work for several months previous has been carried on by the officers without the help of a committee.

Philadelphia Chapter Discusses House Heating with Fluid Fuels

The first fall session of the Philadelphia chapter was devoted to a discussion of domestic heating with oil, gas and district steam, following an outline of the present status of oil and gas burning by P. E. Fansler, associate editor of THE HEATING AND VENTILATING MAGAZINE.

The high light of the meeting, which was attended by three score members and seven members of the national council, was the presentation, by President W. H. Driscoll, of past president's emblems to Stewart A. Jellett and John Gormly. Mr. Jellett responded with a delightful reminiscence of the founding of the society, and of its growth. Mr. Gormly was unable to attend on account of ill health, and a letter from him was read, requesting that the token be delivered to him quietly at a later date.

Mr. Fansler developed his talk on the argument that the conflict in domestic heating in the future would shape up between the oil and gas interests, and that coal was not properly a competitive fuel because, with it, the same results could not be obtained. He then discussed the various types of oil burners used for domestic heating, describing their characteristics of operation and fuel requirements.

A lively discussion was led by Stewart A. Jellett, and participated in by R. V. Frost, Dean Anderson, R. C. Bolsinger and F. D. Mensing.

Engineering Society of Buffalo Hears Talk on Theater Ventilation

Theater ventilation was discussed by D. C. Lindsay of the Carrier Engineering Corporation, Newark, N. J., at a meeting of the Engineering Society of Buffalo, held at the Hotel Statler, October 12. The meeting was attended by about 200, including members and their guests from the American Public Health Association. The talk was illustrated and included a description of a typical installation and a review of various methods of ventilating and air cooling, as well as some experiences in air conditioning work.

Inspection of Holland Vehicular Tunnel by New York Chapter Members

Members and guests of the New York Chapter went over the top at the Chapter's November meeting, Nov. 15, breaking all attendance records with a total of 170 present when dinner was served at the Buiding Trades Club, New York. Everyone had a good appetite, having just returned from an inspection trip through the Holland Vehicular Tunnel, under the Hudson River, which started at 4 o'clock in the afternoon and lasted until about 6 P.M.

After-dinner speakers, consisting of President W. H. Driscoll, W. T. Jones, of Boston, and C. V. Haynes, were brief in their remarks, in order not to encroach on the time allotted to A. C. Davis, engineer-in-charge of ventilation, for the New York and New Jersey Bridge and Tunnel Commission for his talk on the Hudson Vehicular Tunnel.

Mr. Davis gave a comprehensive and interesting talk, illustrated by stereopticon views, not only of the tunnel itself, but of the experimental work forming the basis on which the ventilation scheme used in the tunnel is designed. A rising vote of thanks was extended to Mr. Davis at the conclusion of his address and an informal discussion followed.

The Illinois Chapter

President W. H. Driscoll was the principal guest and speaker at the monthly meeting of the Illinois Chapter, held in the Crystal Room of the Hotel Sherman, Chicago, Ill., November 8.

Mr. Driscoll first outlined the early history of the society and spoke of a semi-annual meeting held in Detroit, Mich., in 1904, where only twenty-two members were in evidence. This was followed by a stereopticon lecture entitled "Heating the Skyscraper," after which medals were presented to two past presidents of the Society, Samuel R. Lewis and Harry M. Hart, who are both members of the Illinois Chapter.

The proposed new Chicago code on ventilation was discussed and a committee was appointed to study the tentative draft.

Wisconsin Chapter

"Central Heating Plants in Milwaukee" was the subject discussed by H. Warhanek, of the Milwaukee Railway and Light Company, at the Chapter regular monthly meeting, held October 18, at the City Club. Mr. Warhanek's talk embraced the various heating plants owned and operated by his company and which heat about 90% of the downtown portion of Milwaukee.

St. Louis Chapter

Members of the St. Louis Chapter, at the regular meeting October 13, were requested by their chairman to volunteer to make talks before parent and teacher associations, as well as other similar bodies, for the purpose of educating them in proper methods of firing so as to gradually bring about a reduction in smoke.

The topic of the meeting was "Smoke Abatement and the Relation of this Chapter to the Subject" and the chairman was instructed to send out letters in an effort to secure speaking volunteers for the proposed educational campaign.

At the chapter's September meeting, which was also the annual meeting, held at the River View Club, September 11, a talk on the progress of the society was given by Professor J. H. Kinealy. Following an afternoon devoted to golf and bridge, dinner was served and E. B. Langenberg introduced the speakers of the evening.

Previous to Professor Kinealy's talk, the opportunity was taken by W. S. Sodemann to present Professor Kinealy with the insignia of the society, which was gracefully received and acknowledged by Professor Kinealy.

President Driscoll Speaks Before Ontario Chapter

At a meeting of the Ontario Chapter, October 4, 1926, at School of Mining, University of Toronto, and under the chairmanship of A. J. Dickey of C. A. Dunham Co., Ltd., a talk on big heating installations was given by W. H. Driscoll, president of the A.S.H. & V.E. and vice-president of the Thompson-Starrett Company of New York.

Michigan Chapter Has Talk on Gas Heating

Home heating by gas was the subject of a discussion by W. J. Hampton of the Detroit City Gas Company at the November meeting of the Michigan Chapter held November 13.

Mr. Hampton, in the course of his remarks, stated that gas for heating is being sold in Detroit for $0.79 per 1000 cu. ft. for the first 50,000 cu. ft. and $0.75 per 1000 cu. ft. for the second 50,000 cu. ft. He also quoted the operating figure of $0.82 per square foot of steam radiation per season as the average cost of gas heating in Detroit.

Following the gas talk, brief addresses were made by Frank Schulle of the Ever-Hot Heater Company, and by Mr. Treadway, of the Bryant Heater Company, after which questions and discussions of gas heating took place.

Western New York Chapter Hears About Future Design of Skyscrapers

The future design of the skyscraper was the theme introduced by H. W. Corbett, architect, of New York, at the monthly meeting of the Western New York Chapter, which was held November 17.

Profusely illustrated with a number of slides, Mr. Corbett's talk covered work which he had recently completed and the prevailing tendencies in high building design. A novel scheme of heating the Bush Building in London by the panel method was described. Mr. Corbett is a firm believer in the utility and economy of the skyscraper when properly designed and stated that the city of the future would have set-back buildings, sidewalks above the heavy traffic, these sidewalks being carried on cantilever beams projecting from the building, main automobile traffic at the street level and rail traffic on a lower level.

Massachusetts Chapter

Over sixty members and guests attended the opening meeting of the Massachusetts Chapter, October 5, at the Engineers Club, Boston, and heard a talk given by Nils Sellman, engineer of utilization for the New York Consolidated Gas Company, on the commercial use of gas in heating and for domestic refrigeration. The talk was profusely illustrated with slides.

Electrical Safety Control for Holland Vehicular Tunnel

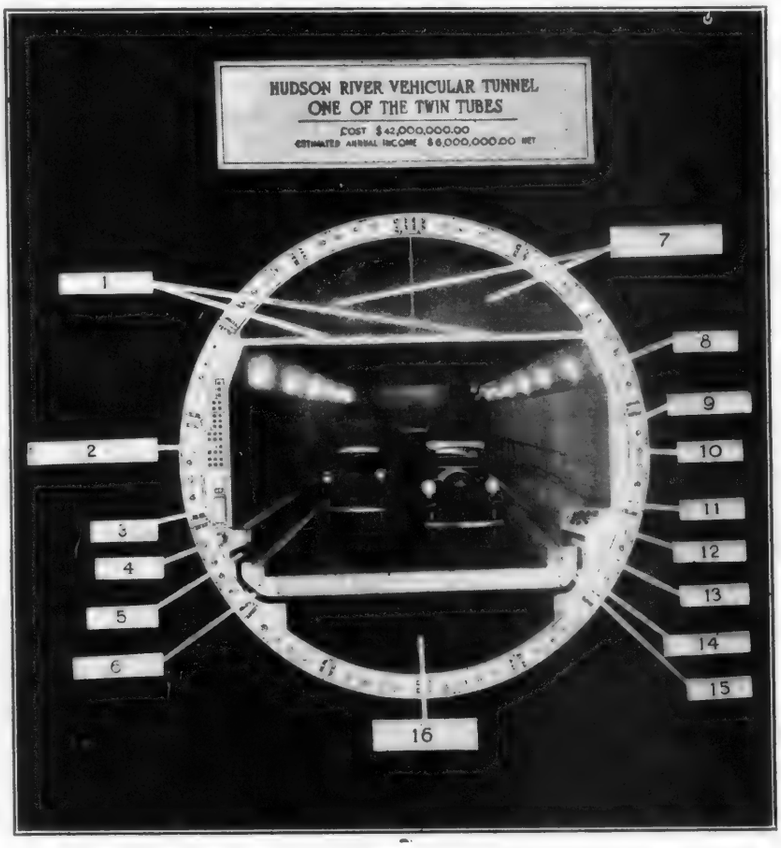
An electrical protective system will insure super-safety to the Holland Vehicular Tunnel between New York and New Jersey. According to R. E. Bedworth, Westinghouse engineer, an order totalling half a million dollars for necessary equipment has been awarded by Fischback & Moore, electrical contractors, to the Westinghouse Electric and Manufacturing Company. The new vehicular tunnel is to have the most elaborate provisions for safety of its users of any place in the world.

A board located in the administration building in New York and carrying 926 pilot lights will inform a central operator of everything going on within the tunnel and will enable him to take full charge of any situation at any time.

The pilot-light board in the control room will show definite signals indicating the status and speed for every piece of ventilating apparatus and the conditions of every circuit serving the tunnel. If a motor fails, a fan breaks down, a circuit goes dead, or a short circuit develops anywhere, a bell will ring, and a bright light, indicating the location and character of the trouble, will appear. The operator can stop the bell, but the light will continue bright until the trouble is corrected. When everything is in good order, the pilot lights will burn dim, so that a bright light instantly attracts attention and calls for an investigation.

The 84 ventilating fans, located in the four ventilating-shaft buildings serving the tunnels, will be under the control of this central operator. Six independent circuits will provide the power for these fans and duplicate equipment will always be in readiness to take the place of any fan that goes out of commission. But if in spite of all these precautions the fans should fail and the air in the tunnel becomes too heavily charged with exhaust vapors, the 'stop engine' signal will be flashed, thereby preventing further contamination of the air until the ventilating equipment is put into operation again.

Should anything go wrong in the central control room, the fans can be controlled independently in the shaft buildings where they are located.



Tunnel Model Showing Ventilating and Construction Details

1. Exhaust air ports every 15 ft. throughout.
2. Telephone and telegraph cables.
3. Fire extinguisher.
4. Water supply pipe.
5. Continuous duct for fresh-air supply to roadway.
6. Fresh-air flues every 15 ft. throughout.
7. Exhaust air duct running through the entire length of tunnel.
8. Tunnel segment weight, 3,000 lbs.
9. Weight of complete ring, 21.6 tons.
10. Concrete.
11. Sidewalk.
12. Power cables for operation of tunnel.
13. Fresh-air expansion chamber.
14. Fresh-air flues every 15 ft. throughout.
15. Drain.
16. Fresh-air duct running through the entire length of the tunnel.

National Advertising Program for the Heating and Plumbing Industries

A plan for co-operative advertising, on a national scale, of the heating and plumbing industries was disclosed at the Sixth Annual Conference of Sales and Advertising Managers, held under the auspices of the National Trade Extension Bureau at the Palmer House, Chicago, November 10 and 11. No less than $300,000 is the amount set to be raised during 1927 for this purpose. The advertising will follow along lines similar to the campaigns conducted by the Copper and Brass Research Association and the Pittsburgh manufacturers of cast-iron pipe.

C. B. Nash, advertising manager of the Standard Sanitary Manufacturing Company, of Pittsburgh, quoted President Theodore Ahrens of that company as stating that a small group of men, representing large companies, feels that the time is ripe for an immediate increase in the funds to be put at the disposal of the National Trade Extension Bureau to be devoted to co-operative advertising.

C. W. Farrar, of the Excelso Specialty Works, Buffalo, N. Y., told how 51 industries had spent $3,720,000 in co-operative advertising during 1925 and how 35 of these industries had made a big success of it. "It is shameful," he declared, "that we have hesitated so long in going into the co-operative advertising field."

Other speakers included President Albert J. Wilson, of the National Association of Master Plumbers; President Henry E. Longley, of the National Trade Extension Bureau; Secretary W. E. McCullom of the Central Supply Association; Secretary-Manager William G. Bergner of the T.E.B.: E. L. Flentje, of the T.E.B.; George V. Christie, of Johns-Manville, Inc., New York; William J. Lang, a director of the National Association of Master Plumbers and C. D. Brownell, of Champaign, Ill.

Before the meeting adjourned Secretary-Manager William G. Bergner of the T.E.B. was given a vote of confidence. Eighty-four representatives of the various interests concerned were in attendance.

Gas in Half of Our Homes Means a Total Increase in Gas Sales of 400%

One-sixth of the output of coal in the United States is burned in our homes, mostly for heating purposes, says Gas Progress for November 15. In a great majority of the homes which are located in cities and towns, the same residences are piped for gas. If only one-half of the coal consumed for house heating in the cities were replaced by gas, it goes on to say, it would mean an increase in gas sales of over 400%.

National District Heating Association

Plans for Forthcoming Annual Meeting

Plans for the forthcoming meeting of the National District Heating Association, to be held at West Baden, Ind., May 10-13, 1927, were perfected at a meeting of the Executive Committee in Detroit, October 5 and 6.

As in previous years, technical committee reports will have a large place on the program. In furthering the work of the Information Committee as the Development Committee is now called and of which John W. Meyer is chairman, it was decided to prepare two more sets of slides for the committee's use. Hereafter, it will be considered one of the standing committees of the association, subject to the control of the executive committee.

It was decided to have the Meters and Accessories Committee consider the question of a demand meter for measuring the demand of the buildings heated and the committee was instructed to gather data along that line.

The Rates and Regulations Committee was instructed to consider the development of a demand rate.

In the report of the Station Operating Committee, a study will be made of feedwater treatment applicable to heating plants, and the committee will collect data on deaeration. The committee will also report on pre-heaters and cinder elimination where pulverized coal is used.

In connection with the Handbook of the association J. H. Walker stated that probably twelve new sheets would be ready during 1927.

The Heat Utilization Committee was instructed to take up with manufacturers the preparation of a list of appliances that the association could recommend as heat-saving devices. In this connection, it was brought out that the Information Committee will have a brochure prepared for general distribution on this subject.

Other reports, which are in process of preparation, are those of the Research Committee, Operating Statistics Committee, Hot Water Committee and Distribution Committee.

It was decided that one of the subjects to be considered at the forthcoming convention will be a round table on small plant operation.

H. C. Kimbrough will again act as chairman of the Entertainment Committee. Headquarters for the convention will be in the West Baden Springs Hotel, West Baden, Ind.

District Heating Rates for 1926-1927

IN accordance with the custom of the National District Heating Association for the past nine years, the October issue of the association's *Bulletin* is devoted to the district heating rates prevailing in the United States and Canada. Every effort has been made to bring these rates up to date and to insure their accuracy. The cities covered include:

Alexandria, Minn.
Albert Lea, Minn.
Anderson, Ind.
Auburn, N. Y.
Aurora, Ill.
Atlanta, Ga.
Atlantic City, N. J.
Aurora, Neb.
Adrian, Mich.
Baltimore, Md.
Bloomsburgh, Pa.
Batesville, Ind.
Beaver Dam, Wis.
Benson, Minn.
Birmingham, Ala.
Bloomington, Ill.
Boulder, Colo.
Boston, Mass.
Butte, Mont.
Battle Creek, Mich.
Boone, Iowa
Bristol, Conn.
Bismark, N. Dak.
Coatesville, Pa.
Carroll, Iowa.
Canton, Ill.
Chicago, Ill.
Cleveland, Ohio.
Canton, Ohio.
Clinton, Ill.
Casper, Wyo.
Champaign, Ill.
Cheyenne, Wyo.
Clearfield, Pa.
Cedar Rapids, Iowa.
Canby, Minn.
Columbus, Ohio.
Detroit, Mich.
Davenport, Iowa.
Delaware, Ohio.
Duluth, Minn.
Dayton, Ohio.
Danville, Ill.
DeKalb and Sycamore, Ill.
Denver, Colo.
Eagle Grove, Iowa.
Elwood, Ind.
Erie, Pa.
Evansville, Ind.
Eveleth, Minn.
Evanston, Ill.
Fargo, N. Dak.
Fort Scott, Kans.
Faribault, Minn.
Forsyth, Mont.
Frankfort, Ind.
Fremont, Ohio.
Grand Forks, N. Dak.
Glendive, Mont.
Grinnell, Iowa.
Grand Rapids, Mich.
Harrisburg, Pa.
Hudson, Wis.
Hibbing, Minn.
Hornell, N. Y.
Hillsboro, Ill.
Huntington, Ind.
Indianapolis, Ind.
Johnstown, Pa.
Kokomo, Ind.
Kansas City, Mo.
Little Rock, Ark.
Lockport, N. Y.
Louisville, Ky.
Logansport, Ind.
La Porte, Ind.
Lima, Ohio.
La Crosse, Wis.
La Fayette, Ind.
Lincoln, Neb.
Lansing, Mich.
Manchester, Iowa.
Milwaukee, Wis.
Minot, N. Dak.
Marion, Iowa.
Mexico, Mo.
Missoula, Mont.
New Philadelphia, Ohio
New Castle, Ind.
Noblesville, Ind.
New York, N. Y.
Oak Park, Ill.
Oskaloosa, Iowa.
Ottumwa, Iowa.
Overbrook, Pa.
Paducah, Ky.
Peru, Ind.
Penn Yan, N. Y.
Perry, Iowa.
Pittsfield, Mass.
Pontiac, Ill.
Peoria, Ill.
Pekin, Ill.
Pittsburgh, Pa.
Portland, Ore.
Phillipsburg, Pa.
Pottsville, Pa.
Quincy, Ill.
Red Oak, Iowa.
Rochester, Ind.
Rockford, Ill.
Rochester, N. Y.
Reading, Pa.
Renovo, Pa.
Sioux City, Iowa
South Bend, Ind.
Springfield, Ohio.
St. Joseph, Mo.
San Diego, Cal.
St. Louis, Mo.
Streeter, Ill.
St. Paul, Minn.
South St. Paul, Minn.
San Francisco, Cal.
Spokane, Wash.
Springfield, Mo.
Saginaw, Mich.
Scranton, Pa.
Springfield, Ill.
Salt Lake City, Utah.
Seattle, Wash.
Toledo, Ohio.
Tacoma, Wash.
Towanda, Pa.
Terre Haute, Ind.
Virginia, Minn.
Waukegan, Ill.
Wilkes-Barre, Pa.
West Chester, Pa.
Wadena, Minn.
Watertown, S. Dak.
Windber, Pa.
Worcester, Mass.
Winnipeg, Canada.
York, Pa.
Youngstown, Ohio.

To Study Garage Ventilation Problems

Committees Appointed at Request of N. F. P. A. Meet at Research Laboratory

THE first meeting of the National Fire Protection Association's Committee on Garages was held at the research laboratory of the American Society of Heating and Ventilating Engineers at Pittsburgh, Pa., October 27. The entire day was taken up by a general discussion of the various phases of the garage problem.

In outlining the scope of the committee's work, the chairman, H. E. Newell of the National Board of Fire Underwriters, stated that one of the most perplexing problems now confronting fire protection and prevention interests was that introduced by the so-called "sub-basement" garage. He stated that there is a growing tendency especially in the larger cities to utilize the sub-basement or a series of sub-basements for garage purposes. The solution of the ventilation problem in these cases is a difficult one and the committee's findings will undoubtedly go a long way in determining the attitude of municipal and other enforcing authorities towards garages of this character.

BUS GARAGES PRESENT DIFFICULT PROBLEMS

One of the other high lights in the general discussion was that relating to bus garages. In many cities the transition from the street car to the bus has been so rapid that public utility corporations have not had an opportunity to provide buildings especially constructed for bus garages. As a result in many instances buses will be found housed in old car barns or possibly other buildings unsuited for such purposes. Here again the problem of ventilation not only from the fire hazard viewpoint but life hazard as well, comes in.

The problem is one of far-reaching import, since there are numerous types of garage construction to be considered, and likewise nearly every manufacturer of heating equipment insists that his system is applicable to garage heating. Obviously, there will have to be a careful distinction made in this respect, especially in view of the fact that the gases prevalent in garages are highly inflammable, and this alone is sufficient to bar some of the types of heating equipment which are frequently recommended for this class of work.

Some distinction will doubtless be made between the garage, which does repair work, as compared to the one which is used merely for storage purposes. However, this can be determined only after a careful survey has been made of the conditions as they actually exist at the present time.

The committee also gave consideration to repair pits. In latter years the tendency has been to use ramps instead of pits. In the opinion of the committee members the pit introduces a severe fire hazard for the reason that it permits the accumulation of vapors. No definite action was taken, however, as a sub-committee on hazards will later go into this feature in detail.

The following conference committees have been appointed, the committee on heating and ventilation being given in full and the chairmen only of the other committees.

CONFERENCE COMMITTEE ON HEATING AND VENTILATION

Owen N. Walther, chairman, 1502 Locust Street, Philadelphia (representing A.S.H. & V.E.).
W. P. Yant, U. S. Bureau of Mines Experimental Station, Pittsburgh, Pa.
J. Sanderson Trump, secretary, Philadelphia Fire Underwriters Association, 135 South Fourth St., Philadelphia, Pa.
H. E. Newell, National Board of Fire Underwriters, 85 John St., New York.

CONFERENCE COMMITTEE ON HAZARDS

H. E. Newell, chairman, National Board of Fire Underwriters, 85 John St., New York.

CONFERENCE COMMITTEE ON PROTECTION

E. P. Boone, chairman, Automatic Sprinkler Department, New York Fire Insurance Rating Organization, 85 John St., New York.

CONFERENCE COMMITTEE ON BUS GARAGES

A. M. Schoen, chairman, Southeastern Underwriters Association, Trust Company of Georgia Building, Atlanta, Ga.

It is understood that the National Society of Warm Air Heating and Ventilating Engineers will appoint a representative to serve on the committee on heating and ventilation.

The chairmen of the various conference committees have been instructed to have their reports ready for consideration by the main committee when it meets during the middle part of February, 1927.

In Business Three Quarters of a Century

A list of firms in business for at least 75 years, including those engaged in the sheet metal and heating industries, was compiled and published by the *New York Times* on its seventy-fifth anniversary, September 19, 1926. We would request anyone knowing any additions which could be made to this honor roll to send them along. The list as given, includes the following:

E. B. Badger & Sons Co., Boston.
Boynton Furnace Co., New York City.
Buck's Stove & Range Co., St. Louis, Mo.
Abram Cox Stove Co., Philadelphia, Pa.
Gurney Foundry Co., Ltd., Toronto, Ont., Canada.
International Heater Co., Utica, N. Y.
Monitor Furnace Co., Cincinnati, Ohio.
Tuttle & Bailey Mfg. Co., New York City.

Publicity and Advice on Home Heating Plants

Newspaper suggestions and advice to the man who runs a warm-air furnace is the course entered upon by the National Warm-Air Heating and Ventilating Association. The first article has already been run and others are to follow.

It is stated that after eight years of research work, there is accumulated information showing good proof that the fuel waste in homes during winter months reached alarming figures, 75% being not an uncommon height in homes where little thought is given to the proper operation of the furnace.

The balance of the article goes into various sources of waste and the best methods of overcoming them.

Of course, if you have made no effort at all, you could hardly expect to receive any very *large* benefits, but you may be sure that those who made a legitimate and honest effort to put the holiday selling effort across are no worse off and a lot of them undoubtedly have profited materially.

Get out and do your duty for the few days remaining and surprise yourself at what can be accomplished with some real effort, backed by a nation-wide campaign.

American Oil Burner Association Studying the Patent Situation

John E. Hubbell, a graduate engineer and a patent attorney of nearly thirty years' practice, has been retained by the American Oil Burner Association to make a complete study and appraisal of all oil-burner patents and such others as may affect the validity of oil-burner control or ignition patents. A committee of three oil-burner engineers has been appointed to act as consultants with Mr. Hubbell in this matter.

It is anticipated that Mr. Hubbell will make his report in early Spring, undoubtedly prior to the annual meeting of the association. It is the primary intent of this action to secure amicable adjustment wherever possible, instead of allowing the matters in dispute to go into court.

INFILTRATION

Stationary Wood Sash	25	French Doors	100
Double Hung Wood Sash	50	Outside Doors	200
Double Hung Steel Sash	100	Outside Doors with Storm Doors	100
Casement Windows	100	Outside Doors with	
Fenestra	100	Inner Vestibule Doors	100

Metal Weather Strip Deducts 50%

HEATING AND PIPING CONTRACTORS

STANDARD RADIATION ESTI

SHOWING RADIATION REQUIRED FOR Q

Copyright 1924, by Heating and Piping Contractors National Association. For Other Construction than tha

3 Col 38" St'm Rad	GLASS		INFILTRATION				OUTSIDE WALLS																
	Win. or Door	Sky Light	Rate per Lin. Ft.				Plain Brick			Brick and Pl.			Brick Fur. L. P.			Br. 4" Tile Pl.			Plain Conc.			Conc. Fu	
			25	50	100	200	8"	12"	16"	8"	12"	16"	8"	12"	16"	4"	8"	12"	8"	12"	16"	8"	12"
	1.1	1.3	0.45	0.9	1.8	3.6	.42	.32	.26	.38	.29	.25	.27	.23	.21	.30	.26	.22	60	.48	.41	50	.40
225	60.5	71.5	25.0	50.0	100	200	23.1	17.6	14.3	20.9	16.0	13.8	14.9	12.7	11.6	16.5	14.3	12.1	33.0	26.4	22.6	27.5	22.
1	3.72	3.15	9.0	4.5	2.25	1.13	9.7	12.8	15.7	10.8	14.1	16.3	15.1	17.7	19.4	13.6	15.7	18.6	6.8	8.5	10.0	8.2	10.
2	7.44	6.30	18.0	9.0	4.50	2.25	19.4	25.6	31.4	21.6	28.2	32.6	30.2	35.4	38.8	27.2	31.4	37.2	13.6	17.0	20.0	16.4	20.
3	11.2	9.45	27.0	13.5	6.75	3.38	29.1	38.4	47.1	32.4	42.3	48.9	45.3	53.1	58.2	40.8	47.1	55.8	20.4	25.5	30.0	24.6	30.
4	14.9	12.6	36.0	18.0	9.00	4.50	38.8	51.2	62.8	43.2	56.4	65.2	60.4	70.8	77.6	54.4	62.8	74.4	27.2	34.0	40.0	32.8	40.
5	18.6	15.8	45.0	22.5	11.3	5.63	48.5	64.0	78.5	54.0	70.5	81.5	75.5	88.5	97.0	68.0	78.5	93.0	34.0	42.5	50.0	41.0	51.
6	22.3	18.9	54.0	27.0	13.5	6.75	58.2	76.8	94.2	64.8	84.6	97.8	90.6	106	116	81.6	94.2	112	40.8	51.0	60.0	49.2	61.
7	26.0	22.1	63.0	31.5	15.8	7.88	67.9	89.6	110	75.6	98.7	114	106	124	136	95.2	110	130	47.6	59.5	70.0	57.4	71.
8	29.8	25.2	72.0	36.0	18.0	9.00	77.6	102	126	86.4	113	130	121	142	155	109	126	149	54.4	68.0	80.0	65.6	81.
9	33.5	28.3	81.0	40.5	20.2	10.1	87.3	115	141	97.2	127	147	136	159	175	122	141	167	61.2	76.5	90.0	73.8	91.
10	37.2	31.5	90.0	45.0	22.5	11.3	97.0	128	157	108	141	163	151	177	194	136	157	186	68.0	85.0	100	82.0	102
11	40.9	34.7	99.0	49.5	24.8	12.4	107	141	173	119	155	179	166	195	213	150	173	205	74.8	93.5	110	90.2	112
12	44.6	37.9	108	54.0	27.0	13.5	116	154	188	130	169	196	181	212	233	163	188	223	81.6	102	120	98.4	122
13	48.4	41.0	117	58.5	29.2	14.6	126	166	204	140	183	212	196	230	252	177	204	242	88.4	111	130	107	133
14	52.1	44.1	126	63.0	31.5	15.8	136	179	220	151	197	228	211	248	272	190	220	260	95.2	119	140	115	143
15	55.8	47.2	135	67.5	33.7	16.9	146	192	236	162	212	245	227	266	291	204	236	279	102	128	150	123	153
16	59.5	50.4	144	72.0	36.0	18.0	155	205	251	173	226	261	242	283	310	218	251	298	109	136	160	131	163
17	63.2	53.5	153	76.5	38.2	19.1	165	218	267	184	240	277	257	301	330	231	267	316	116	145	170	139	173
18	67.0	56.7	162	81.0	40.5	20.3	175	230	283	194	254	293	272	319	349	245	283	335	122	153	180	148	184
19	70.7	59.9	171	85.5	42.8	21.4	184	243	298	205	268	310	287	336	369	258	296	353	129	162	190	156	194
20	74.4	63.0	180	90.0	45.0	22.5	194	256	314	216	282	326	302	354	388	272	314	372	136	170	200	164	204
21	78.1	66.1	189	94.5	47.2	23.6	204	269	330	227	296	342	317	372	407	286	330	391	143	179	210	172	214
22	81.8	69.3	198	99.0	49.5	24.8	213	282	345	238	310	359	332	389	427	299	345	409	150	187	220	180	224
23	85.6	72.4	207	104	51.8	25.9	223	294	361	248	324	375	347	407	446	313	361	428	156	196	230	189	235
24	89.3	75.7	216	108	54.0	27.0	233	307	377	259	338	391	362	425	466	326	377	446	163	204	240	197	245
25	93.0	78.8	225	113	56.2	28.1	243	320	393	270	353	408	378	443	485	340	393	465	170	213	250	205	255

For Methods of Using Table See Back of Sheet.

INFILTRATION

Stationary Wood Sash	25	French Doors	100
Double Hung Wood Sash	50	Outside Doors	200
Double Hung Steel Sash	100	Outside Doors with Storm Doors	100
Casement Windows	100	Outside Doors with	
Fenestra	100	Inner Vestibule Doors	100

Metal Weather Strip Deducts 50%

HEATING AND PIPING CONTRACTORS

STANDARD RADIATION ESTIMA

SHOWING RADIATION REQUIRED FOR QU

Copyright 1924, by Heating and Piping Con tractors National Association. For Other Construction than that S

3 Col 38" St'm Rad	GLASS		INFILTRATION				OUTSIDE WALLS																
	Win. or Door	Sky Light	Rate per Lin. Ft.				Plain Brick			Brick and Pl.			Brick Fur. L. P.			Br. 4" Tile Pl.			Plain Conc.			Conc. Fur L	
			25	50	100	200	8"	12"	16"	8"	12"	16"	8"	12"	16"	4"	8"	12"	8"	12"	16"	8"	12"
	1.1	1.3	0.45	0.9	1.8	3.6	.42	.32	.26	.38	.29	.25	.27	.23	.21	.30	.26	.22	60	.48	.41	.50	.40
225	49.5	58.5	20.3	40.5	81.0	162	18.9	14.4	11.7	17.1	13.1	11.3	12.2	10.4	9.45	13.5	11.7	9.90	27.0	21.6	18.5	22.5	18.0
1	4.55	3.85	11.1	5.56	2.78	1.39	11.9	15.6	19.2	13.2	17.2	19.9	18.5	21.6	23.9	16.7	19.2	22.7	8.34	10.4	12.2	10.0	12.5
2	9.10	7.70	22.2	11.1	5.56	2.78	23.8	31.2	38.4	26.4	34.4	39.8	37.0	43.2	47.8	33.4	38.4	45.4	16.7	20.8	24.4	20.0	25.0
3	13.7	11.6	33.3	16.7	8.34	4.17	35.7	46.8	57.6	39.6	51.6	59.7	55.0	64.8	71.7	50.1	57.6	68.1	25.0	31.2	36.6	30.0	37.5
4	18.2	15.4	44.4	22.2	11.1	5.56	47.6	62.4	76.8	52.8	68.8	79.6	74.0	86.5	95.6	66.8	76.8	90.8	33.4	41.6	48.8	40.0	50.0
5	22.8	19.3	55.5	27.8	13.9	6.95	59.5	78.0	96.0	66.0	86.0	99.5	92.5	108	120	83.5	96.0	114	41.7	52.0	61.0	50.0	62.5
6	27.3	23.1	66.6	33.4	16.7	8.34	71.4	93.6	115	79.2	103	119	111	130	143	100	115	136	50.0	62.4	73.2	60.0	75.0
7	31.9	27.0	77.7	38.9	19.5	9.73	83.3	109	134	92.4	120	139	130	151	167	117	134	159	58.4	72.8	85.4	70.0	87.5
8	36.4	30.8	88.8	44.5	22.2	11.1	95.2	125	154	106	138	159	148	173	191	134	154	182	66.7	83.2	97.6	80.0	100
9	41.0	34.7	99.9	50.0	25.0	12.5	107	140	173	119	155	179	167	195	215	150	173	204	75.1	93.6	110	90.0	113
10	45.5	38.5	111	55.6	27.8	13.9	119	156	192	132	172	199	185	216	239	167	192	227	83.4	104	122	100	125
11	50.1	42.4	122	61.2	30.6	15.3	131	172	211	145	189	219	204	238	263	184	211	250	91.7	114	134	110	138
12	54.6	46.2	133	66.7	33.4	16.7	143	187	230	158	206	239	222	259	287	200	230	272	100	125	146	120	150
13	59.2	50.1	144	72.3	36.1	18.1	155	203	250	172	224	259	241	281	311	217	250	295	108	135	159	130	163
14	63.7	53.9	155	77.8	38.9	19.5	167	218	269	185	241	279	259	303	335	234	269	318	117	146	171	140	175
15	68.3	57.8	167	83.4	41.7	20.9	179	234	288	198	258	299	278	324	359	251	288	341	125	156	183	150	188
16	72.8	61.6	178	89.0	44.5	22.2	190	250	307	211	275	318	296	346	382	267	307	363	133	166	195	160	200
17	77.4	65.5	189	94.5	47.3	23.6	202	265	326	224	292	338	315	367	406	284	326	386	142	177	207	170	213
18	81.9	69.3	200	100	50.0	25.0	214	281	346	238	310	358	333	389	430	301	346	409	150	187	220	180	225
19	86.5	73.2	211	106	52.8	26.4	226	297	365	251	327	378	352	410	454	317	365	431	158	198	232	190	238
20	91.0	77.0	222	111	55.6	27.8	238	312	384	264	344	398	370	432	478	334	384	454	167	208	244	200	250
21	95.6	80.9	233	117	58.4	29.2	250	328	403	277	361	418	389	454	502	351	403	477	175	218	256	210	263
22	100	84.7	244	122	61.2	30.6	262	343	422	290	378	438	407	475	526	367	422	499	183	229	268	220	275
23	105	88.6	255	128	63.9	32.0	274	359	442	304	396	458	426	496	550	384	442	522	192	239	281	220	288
24	109	92.4	266	133	66.7	33.4	286	375	461	317	413	478	444	518	574	401	461	545	200	250	293	240	300
25	114	96.3	278	139	69.5	34.8	298	390	480	330	430	498	463	540	596	418	480	568	209	260	305	250	313

TORS NATIONAL ASSOCIATION
ESTIMATING TABLE
FOR QUANTITIES INDICATED,

ruction than that Shown See Heating and Piping Contractors National Association Engineering Standards.

PITTSBURGH

TEMPERATURE FACTORS		EXPOSURE FACTORS			
Room Temperature	70°=T_1	N	1.30	S	1.30
Base Temperature	+15°=T_0	NE	1.00	SW	1.35
Base Temp. +15° Equivalent to		E	1.00	W	1.35
Guarantee Temp. of 0° Outside		SE	1.00	NW	1.35

Conc. Fur L. P.			Frame Std.	Frame No Sh'g	Frame No L. P.	ROOF T&G on 1" Bd.	ROOF T&G on 4" Conc.	ROOF Sh'gle on Sh'g	ROOF Sh'gle Sh'g L. P.	Base Floor Conc. on Earth	Base Floor Wood on Sleep.	Interm'e Floor 4" Conc.	Interm'e Floor 4" Conc. 3" Fill 1" Fin.	Interm'e Floor Double Wood	Ceiling Lath and Plas.	Ceiling L & P Wo. Fl. Over	Partition Stud L & P 1 Side	Partition Stud L & P 2 Side		Type
8"	12"	16"																		Kind
																				Thick.
50	.40	.34	.24	.31	.35	.30	.60	.40	.30	.31	.13	.20	.15	.20	.49	.28	.60	.33		K
27.5	22.0	18.7	13.2	17.1	19.3	16.5	33.0	22.0	16.5	8.55	3.58	5.5	4.13	5.5	13.5	7.7	16.5	9.08		K(Tr-To)
8.2	10.2	12.0	17.0	13.2	11.7	13.6	6.8	10.2	13.6	26.3	62.9	40.9	54.5	40.9	16.7	29.2	13.6	24.8		1
16.4	20.4	24.0	34.0	26.4	23.4	27.2	13.6	20.4	27.2	52.6	126	81.8	109	81.8	33.4	58.4	27.2	49.6		2
24.6	30.6	36.0	51.0	39.6	35.1	40.8	20.4	30.6	40.8	78.9	189	123	164	123	50.1	87.6	40.8	74.4		3
32.8	40.8	48.0	68.0	52.8	46.8	54.4	27.2	40.8	54.4	105	252	164	218	164	66.8	117	54.4	99.2		4
41.0	51.0	60.0	85.0	66.0	58.5	68.0	34.0	51.0	68.0	132	315	205	273	205	83.5	146	68.0	124		5
49.2	61.2	72.0	102	79.2	70.2	81.6	40.8	61.2	81.6	158	377	245	327	245	100	175	81.6	149		6
57.4	71.4	84.0	119	92.4	81.9	95.2	47.6	71.4	95.2	184	440	286	382	286	117	204	95.2	174		7
65.6	81.6	96.0	136	106	93.6	109	54.4	81.6	109	210	503	327	436	327	134	234	109	198		8
73.8	91.8	108	153	119	105	122	61.2	91.8	122	237	566	368	491	368	150	263	122	223		9
82.0	102	120	170	132	117	136	68.0	102	136	263	629	409	545	409	167	292	136	248		10
90.2	112	132	187	145	129	150	74.8	112	150	289	692	450	600	450	184	321	150	273		11
98.4	122	144	204	158	140	163	81.6	122	169	316	755	491	654	491	200	350	163	298		12
107	133	156	221	172	152	177	88.4	133	177	342	818	532	709	532	217	380	177	322		13
115	143	168	238	185	164	190	95.2	143	190	368	886	573	763	573	234	409	190	347		14
123	153	180	255	198	176	204	102	153	204	395	944	614	818	614	251	438	204	372		15
131	163	192	272	211	187	218	109	163	218	421	1006	654	872	654	267	467	218	397		16
139	173	204	289	224	199	231	116	173	231	447	1069	695	927	695	284	496	231	422		17
148	184	216	306	238	211	245	122	184	245	473	1132	736	981	736	301	526	245	446		18
156	194	228	323	251	222	258	129	194	258	498	1195	771	1036	771	317	555	258	471		19
164	204	240	340	264	234	272	136	204	272	526	1258	818	1090	818	334	584	272	496		20
172	214	252	357	277	246	286	143	214	286	552	1321	859	1145	859	351	613	286	521		21
180	224	264	374	290	257	299	150	224	299	579	1384	900	1199	900	367	642	299	546		22
189	235	276	391	304	269	313	156	235	313	605	1447	941	1254	941	384	672	313	570		23
197	245	268	408	317	281	326	163	245	326	631	1510	982	1308	982	401	701	326	595		24
205	255	300	425	330	293	340	170	255	340	658	1573	1023	1363	1023	418	730	340	620		25

← These Items Figured on Basis of K $\left(\frac{T_1-T_0}{2}\right)$ →

TORS NATIONAL ASSOCIATION
ESTIMATING TABLE
FOR QUANTITIES INDICATED

ruction than that Shown SeeHeating and Piping Contractors National Association Engineering Standards.

SALT LAKE CITY

TEMPERATURE FACTORS		EXPOSURE FACTORS			
Room Temperature	70°=T_1	N	1.10	S	1.10
Base Temperature	+25°=T_0	NE	1.00	SW	1.00
Base Temp. +25° Equivalent to		E	1.10	W	1.10
Guarantee Temp. of +10° Outside		SE	1.10	NW	1.10

Conc. Fur L. P.			Frame Std.	Frame No Sh'g	Frame No L. P.	ROOF T&G on 1" Bd.	ROOF T&G on 4" Conc.	ROOF Sh'gle on Sh'g	ROOF Sh'gle Sh'g L. P.	Base Floor Conc. on Earth	Base Floor Wood on Sleep.	Interm'e Floor 4" Conc.	Interm'e Floor 4" Conc. 3" Fill 1" Fin.	Interm'e Floor Double Wood	Ceiling Lath and Plas.	Ceiling L & P Wo. Fl. Over	Partition Stud L & P 1 Side	Partition Stud L & P 2 Side		Type
8"	12"	16"																		Kind
																				Thick.
50	.40	.34	.24	.31	.35	.30	.60	.40	.30	.31	.13	.20	.15	.20	.49	.28	.60	.33		K
22.5	18.0	15.3	10.8	14.0	15.8	13.5	27.0	18.0	13.5	7.00	2.93	4.50	3.38	4.50	11.0	6.3	13.5	7.45		K(Tr-To)
10.0	12.5	14.7	20.8	16.1	14.3	16.7	8.34	12.5	16.7	32.2	77.0	50.0	66.0	50.0	20.4	35.8	16.7	30.2		1
20.0	25.0	29.4	41.6	32.2	28.6	33.4	16.7	25.0	33.4	64.4	154	100	132	100	40.8	71.6	33.4	60.4		2
30.0	37.5	44.1	62.4	48.3	42.9	50.1	25.0	37.5	50.1	96.6	231	150	198	150	61.2	107	50.1	90.6		3
40.0	50.0	58.8	83.2	64.4	57.2	66.8	33.4	50.0	66.8	128	308	200	264	200	81.6	143	66.8	121		4
50.0	62.5	73.5	104	80.5	71.0	83.5	41.7	62.5	83.5	161	385	250	330	250	102	179	83.5	151		5
60.0	75.0	88.2	125	96.6	85.8	100	50.0	75.0	100	193	462	300	396	300	122	215	100	181		6
70.0	87.5	103	146	113	100	117	58.4	87.5	117	225	537	350	462	350	142	250	117	211		7
80.0	100	118	166	129	114	134	66.7	100	134	258	616	400	528	400	163	285	134	242		8
90.0	113	132	187	145	129	150	75.1	113	150	290	693	450	594	450	183	322	150	272		9
100	125	147	208	161	143	167	83.4	125	167	322	770	500	660	500	204	358	167	302		10
110	138	162	229	177	157	184	91.7	138	184	354	847	550	726	550	224	394	184	332		11
120	150	176	250	193	172	200	100	150	200	386	924	600	792	600	245	430	200	362		12
130	163	191	270	209	186	217	108	163	217	418	1001	650	858	650	265	465	217	392		13
140	175	206	291	225	200	234	117	175	234	450	1078	700	924	700	285	501	234	423		14
150	188	221	312	242	215	251	125	188	251	482	1155	750	990	750	306	537	251	453		15
160	200	235	333	258	229	267	133	200	267	515	1232	800	1056	800	326	573	267	483		16
170	213	250	354	274	243	284	142	213	284	547	1307	850	1122	850	346	608	284	513		17
180	225	265	374	290	257	301	150	225	301	579	1386	900	1188	900	367	644	301	543		18
190	238	279	395	306	272	317	158	238	317	612	1463	950	1254	950	387	680	317	574		19
200	250	294	416	322	286	334	167	250	334	644	1540	1000	1320	1000	408	716	334	604		20
210	263	309	437	338	300	351	175	263	351	676	1617	1050	1386	1050	428	752	351	634		21
220	275	323	458	354	315	367	183	275	367	709	1694	1100	1452	1100	448	788	367	664		22
220	288	338	478	370	329	384	192	288	384	741	1771	1150	1518	1150	469	823	384	694		23
240	300	353	499	386	343	401	200	300	401	773	1848	1200	1584	1200	489	859	401	725		24
250	313	368	520	403	358	418	209	313	418	805	1925	1250	1650	1250	510	895	418	755		25

Legal Decisions

Interest Allowed on Balance of Heating and Plumbing Account—Reasonable Time for Delivery of Materials Ordered

Action was brought for a balance due for heating and plumbing materials furnished for defendant's building, with accrued interest to May 20, 1923, and interest from that date. The accuracy of plaintiff's charges was admitted, but the allowance of interest charges was assigned as error. The evidence showed that plaintiff's regular terms were 60 days, "with interest charged after maturity," and indicated that demand was made for payment prior to May 20, 1923. The Kentucky Court of Appeals held, Tracy v. C. M. McClung & Co., 283 S. W. 956, that the plaintiff was entitled to recover the interest charges.

The defendant filed a counterclaim, and testified that he made a verbal contract with plaintiff's agent for the material in August and informed him that the building was expected to be ready on December 1, and that he so informed the salesman, who stated that plaintiff had the material in stock and would furnish it at once as ordered, and that this was a part of the consideration for the contract; but that its competion was delayed until May 1, resulting in loss of rentals. It was held that this understanding did not seem to have existed on September 29, when the negotiations were finally completed, and such a purpose did not appear from any of defendant's subsequent orders, which continued from time to time until January 2, 1923. It was held that there was, therefore, nothing in the transaction to distinguish it from ordinary sales of this character, in which the seller is required to deliver within a reasonable time, and it was not claimed that the plaintiff failed to do this.

Statute Permitting Court of Claims to Award Contractor Damages for Delay Notwithstanding Contract Provision Held Unconstitutional

The New York Court of Claims holds that a provision in a heating and ventilating contract for State buildings that no charges should be made by the contractor for delays from any cause, though he might be granted an extension of time on account of delays caused by the State authorities, other State contractors, or the condition of the weather, was a complete bar to recovery of damages caused by delays, except such as were caused by the active interference with the work of the contract by the State.

The contractor claimed for damages caused by the fact that the general building contractor did not progress its work as contemplated by its contract, increasing the cost to the claimant under its contract on account of the increased cost of labor, materials, superintendence and insurance during the period of delay in the performance of its contract.

The claimant obtained an act of the Legislature Laws 1923, c. 821, conferring jurisdiction on the Court of Claims to award the claimant the amount of damage sustained by it from the cause alleged. The Attorney General contended that the act contravened article 3, section 28, of the State constitution, in that it provided for increased compensation to a contractor, and with this contention the Court of Claims concurred. The court said: "It also contravenes article 8, section 9, of the State constitution, in that it in effect attempts a gift of moneys of the State in aid of a corporation. Without the benefit of the act, claimant had no valid claim against the State, which had fully met every obligation of the contract which it had assumed. The act seeks to impose upon the State the consequences of acts and omissions, not of the State, but of another contractor, by providing for the payment to claimant of additional compensation equal to the amount whereby the cost of performing its work has been increased by reason of default of the building contractor. There is no moral obligation resting upon the State to pay this extra compensation, and its payment would be a gratuity forbidden by the constitution." A. B. Barr & Co. v. State, 215 N. Y. S. 313.

Sufficiency of Boiler, Where Radiation Increased

In an action on a plumbing and heating contractor's account for the value of labor and materials for certain plumbing work, the defendant counter-claimed on an independent contract, namely, the alleged breach by plaintiff of a written contract to install a heating plant in the defendant's residence. The plaintiff had agreed to install a D. & T. heating system, with Peerless radiation, and an American Arcola heating boiler, and furnish all labor incidental to the proper installation thereof at an agreed price. The installation was made and the plaintiff was paid in full therefor. Under the terms of the contract the plaintiff guaranteed to keep the house at 70° F. temperature when zero weather prevailed outside.

The defendant adduced testimony tending to show that the system was found to be inadequate to heat the premises. Plaintiff adduced testimony to prove that the defendant had added several rooms to his house, with additional radiation, and that, if the heating system was inadequate, it was because of this additional radiation.

It was held, Clukies v. Ryall (Mo. App.) 280 S. W. 85, that the admission in evidence of a letter from the engineer of the manufacturer of the heating system, after an inspection thereof, stating that the boiler was too small to take care of the radiation, introduced as the basis of a complaint made by the defendant in a conversation with the contractor, was not prejudicial, if erroneous, so as to require a new trial, in view of the admission without objection of a letter by the defendant to the contractor containing the same statements as to defects found by the manufacturer of the heating system on its inspection and testimony of the conversation between plaintiff and defendant as to the defects.

The real issues in the case were: First, whether or not the heating plant was inadequate to heat the defendant's house and keep a temperature therein of not less than 70° F. when the temperature out of doors was zero; second, if the jury in fact found that it was not possible to keep the house at 70° temperature when the weather was zero, whether that failure was due to the inadequacy of the heating plant to so heat the original residence, or was due to the fact that the defendant had added additional rooms and additional radiation to the heating plant.

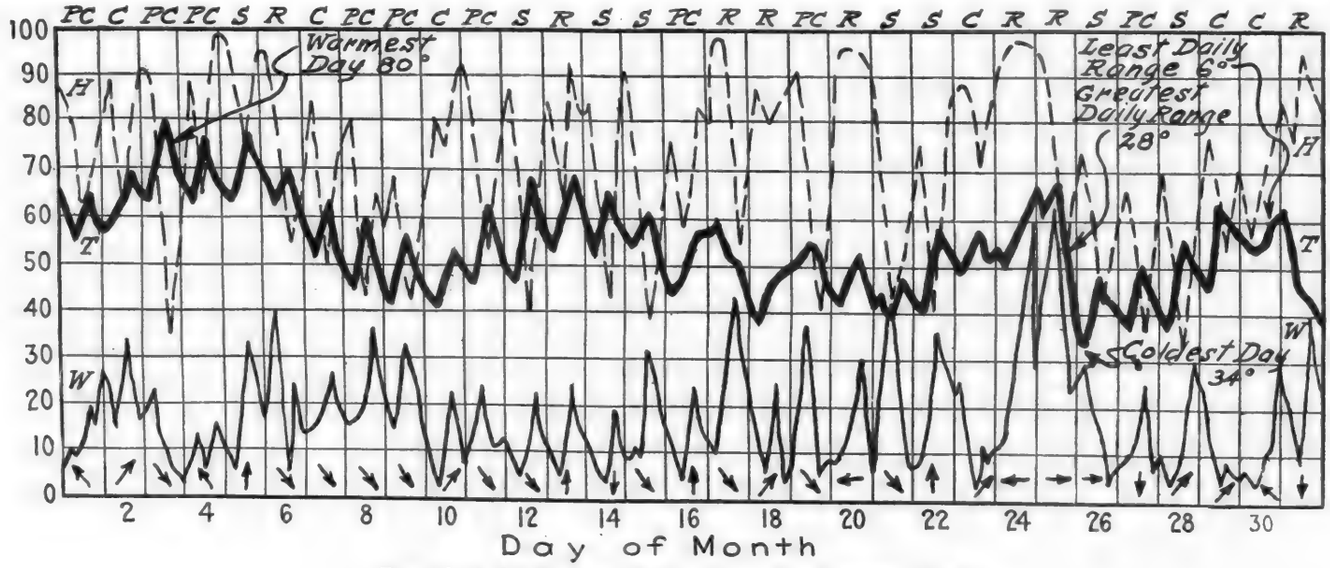
On these issues the evidence was conflicting, and it was for the jury to reconcile it as far as possible and determine with which of the parties it preponderated. This was done, the jury found for the plaintiff on his cause of action and for the defendant on his counterclaim, and it was held that their verdict must be final where no error prejudicial to the losing party appeared in the trial of the case. An order sustaining plaintiff's motion for a new trial was therefore reversed and judgment on the jury's verdict was directed to be reinstated.

Meaning of "Good Heating Service" in Warranty

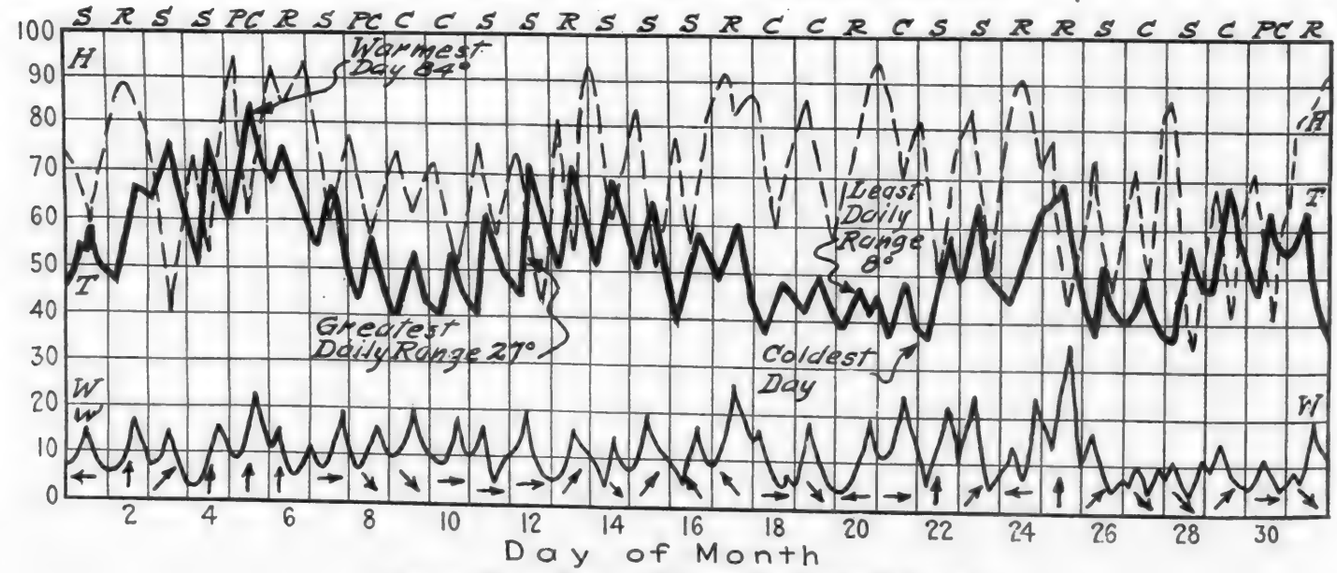
The Wisconsin Supreme Court holds, Jones v. Holland Furnace Co., 206 N. W. 57, that the words "good heating service" in a contract for the installation of a furnace being ambiguous, parol evidence of conversations between the parties when negotiations for the contract were being made that good heating service meant heat up to 70° F. when the temperature outside was 10° below zero, was admissible to explain what was meant by the warranty to provide such service.

The Weather for October, 1926

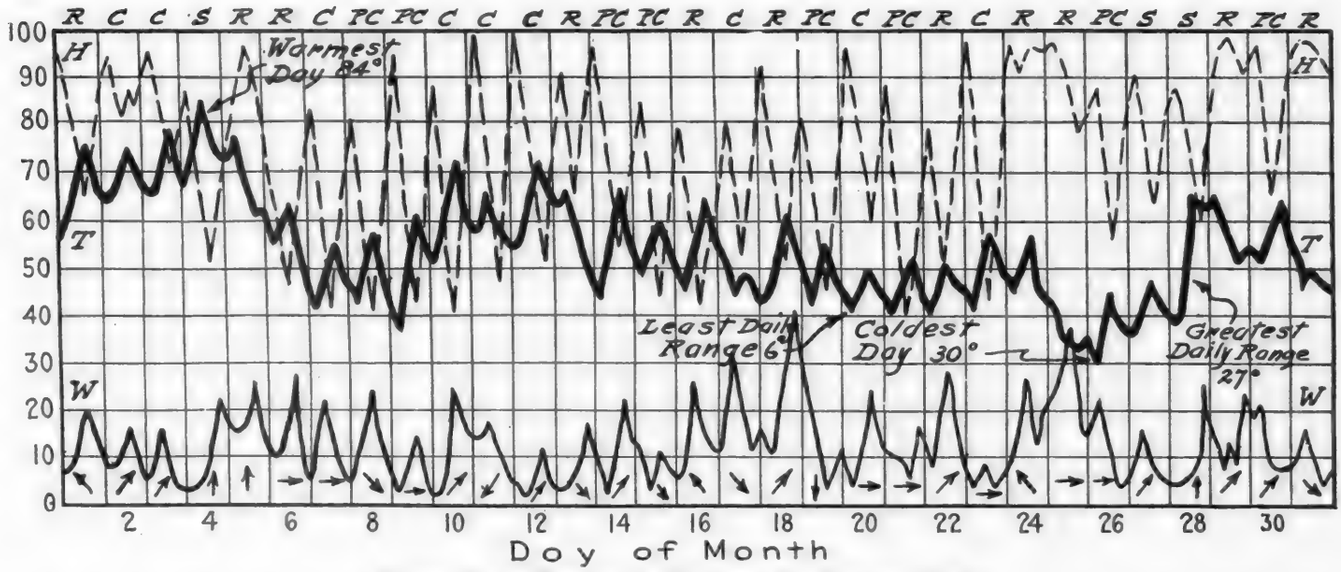
	New York	Boston	Pittsburgh	Chicago	St. Louis
Highest temperature, deg. F	80	84	84	85	87
Date of highest temperature	3	5	4	3	1
Lowest temperature, deg. F	34	36	30	32	33
Date of lowest temperature	26	22	26	27	25
Greatest daily range, deg. F	28	27	27	22	31
Date of greatest daily range	25	12	28	27	27
Least daily range, deg. F	6	8	6	5	6
Date of least daily range	30	20	20	2	20
Mean temp. for month, deg. F	54.2	53.4	53.5	52.4	58.4
Normal mean temp. for month, Deg. F	56.3	53.3	55.6	54.0	58.8
Total precipitation, this month, in	5.11	3.58	4.12	1.67	3.84
Total snowfall, this month, in	Trace	None	Trace	Trace	None
Normal precipitation, this month, in	3.71	3.86	2.36	2.55	2.41
Total wind movement, this month, miles	11739	7203	7586	7732	8341
Average hourly wind velocity, miles	15.8	9.7	10.2	10.4	11.2
Prevailing direction of wind	N.W.	S.W.	W.	N.W.	S.W.
Number of clear days	8	10	4	4	13
Number of partly cloudy days	9	11	12	11	9
Number of cloudy days	14	10	15	16	9
Number of days with preciptation	17	14	25	15	19
Number of days with snow	1	None	1	1	None
Snow on ground at end of month, in	None	None	None	None	None



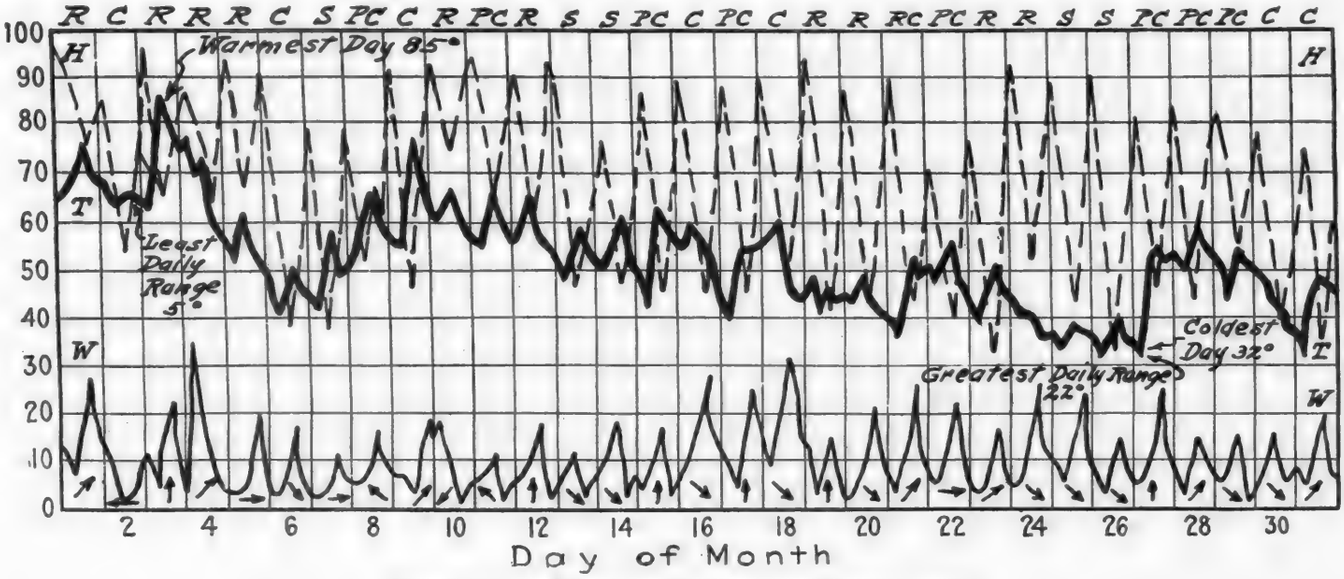
Record of the Weather in New York for October, 1926
(Hourly Observations of the Relative Humidity Plotted on this Chart)



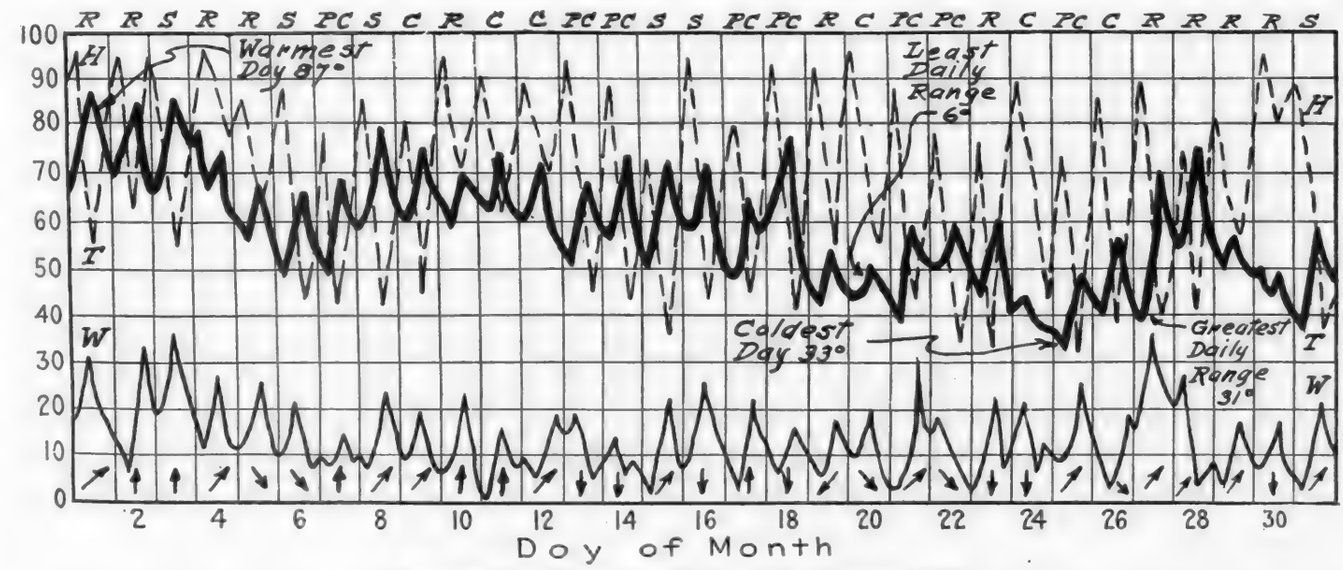
Record of the Weather in Boston for October, 1926



Record of the Weather in Pittsburgh for October, 1926



Record of the Weather in Chicago for October, 1926



Record of the Weather in St. Louis for October, 1926

Plotted from records especially complied for THE HEATING AND VENTILATING MAGAZINE by the United States Weather Bureau.
Heavy lines indicate temperatures in degrees F. Light lines indicate wind in miles per hour.
Broken lines indicate humidity in percentage from readings at 8 A.M., 12 M., and 8 P.M. Arrows fly with prevailing directions of wind.
S—Clear, PC—partly cloudy, C—Cloudy, R-rain, Sn—snow.

Latest Additions to List of Approved Oil Burners

The following additional oil burners, it is announced, have been listed by the National Board of Fire Underwriters since the publication of the July list:

Vesta "Type D" Domestic Oil Burner.
J. S. & J. F. String, Inc., 263 Washington Ave., Newark, N. J.

Mechanical draft oil burner with a.c. electric motor drive; also d.c.; especially equipped with pilot safety switch. Temperature control—Automatic. Ignition—gas pilot. Fuel—oil fuels not heavier than 32° A.P.I. Fuel feed—from special auxiliary supply tank, furnished by manufacturer, to nozzle by pressure of less than 5 lbs. per square inch. Designed for hot water, steam and hot-air installations. Marking: "Type D" on name plate attached to housing of firing unit. "Type B" on Honeywell stack control used with all burners not equipped with pilot safety switch and "Type DS" motor switch.

Homer "Type H" Domestic Oil Burner.
Homer Oil Burner Corp., West Townsend, Mass.

Mechanical draft oil burner with a.c. or d.c. electric motor drive. Temperature control—automatic. Fuel—oil fuels not heavier than 32° A.P.I. Fuel feed—gravity. Designed for hot-water, steam and hot-air installations. Marking: "Type H" on etched name plate attached to cover of burner base.

Sword "Model L" Domestic Oil Burner.
Sword & Kimber Co., 4861 Stenton Ave., Philadelphia, Pa.

Mechanical draft oil burner with a.c. or d.c. motor drive. Temperature control—automatic. Ignition—gas pilot. Fuel—oil fuels not heavier than 36° A.P.I. Fuel feed—suction from supply tank to pump mounted on burner, pressure from pump to combustion chamber. Designed for hot-water, steam or hot-air installations. Marking: "Model L" on etched name plate attached to belt guard.

Senac Automatic "Type H" Domestic Oil Burner.
Senac Automatic Oil Burner Corp., 216 East Superior St., Duluth, Minn.

Mechanical draft oil burner with a.c. electric motor drive. Temperature control—automatic. Ignition—gas pilot. Fuel—oil fuels not heavier than 32° A.P.I. Fuel feed—suction feed to vacuum tank, gravity to nozzle. Designed for hot water, steam and hot-air installations. Marking: "Type H" on etched name plate attached to side of metal cabinet.

Petro "Model L" Domestic Oil Burner.
Petroleum Heat & Power Co., 511 Fifth Ave., New York.

Mechanical draft oil burner with a.c. electric motor drive. Temperature control—automatic. Ignition—gas pilot, electrically ignited. Fuel—oil fuels not heavier than 32° A.P.I. Fuel feed—suction from supply tank to float chamber by pump mounted with blower, then by low air pressure to nozzle assembly. Designed for hot water, steam and hot air installations. Marking: "L" as prefix to manufacturer's model designation on name plate attached to blower housing. "Type B" on Honeywell stack control.

National "Type T-1" Domestic Oil Burner.
National Appliances Installations, Inc., 50 Church St., New York.

Mechanical draft oil burner with a.c. or d.c. motor drive. Temperature control—manual. Ignition—manual. Fuel—oil fuels not heavier than 36° A.P.I. Fuel feed—gravity. Designed for hot water, steam and hot air installations. Marking: "Type T-1" on etched name plate attached to housing on anti-flooding device and cast on main burner casting.

Crown "Type X" Domestic Oil Burner.
Crown Oil Burner Co., 5720 W. Madison St., Chicago, Ill.

Natural draft oil burner. Temperature control—manual. Ignition—manual. Fuel—oil fuels not heavier than 36° A.P.I. Fuel feed—gravity. Designed for hot water, steam or hot air installations having a minimum draft of not less than 0.1 in. water column. Marking: "Type X" on name plate attached to control valve, also cast on burner bowl and air manifold castings.

Simplex "Type U" Industrial Oil Burner.
Bunting Iron Works, Sixth and Parker Sts., Berkeley, Cal.

Mechanical draft oil burner system, consisting essentially of pump set, burner, relief valve, strainer, remote control switch, and no-voltage release switch. Temperature control—manual (anti-flooding device not provided). Ignition—manual. Fuel—oil fuels not heavier than 14° A.P.I. preheated when necessary. Fuel feed—suction from supply tank to pump, pressure from pump to burner. Designed for hot water and steam installations (duplicate pumps provided). Marking: "Type U" on brass master plate attached to base of pump set and appearing on each unit of system mentioned above.

The New York Public Service Commission granted the application of the Lawrence Park Heat, Light & Power Company for authority to construct a steam heating extension in the village of Bronxville notwithstanding the fact that a part of the extension had already been constructed without authority.

American Oil Burner Association

Sales Campaign by Mail Now Under Way

The plan to stimulate oil-burner sales through the operation of an extensive mail campaign, as reported to the last annual convention of the association, and several times noted in THE HEATING AND VENTILATING MAGAZINE during the interim, is meeting with marked success, according to reports.

The idea contemplates a systematic bombardment of two groups—members of the association and groups of representative architects, building contractors and heating contractors—with carefully prepared and timed literature.

The campaign to the members includes pamphlets on "agency suggestions", "facts", "fuel supply", "selling", heating plant", "installing", "servicing", and "fuel oil." Literature, chiefly in the form of news bulletins, goes to heating contractors, architects and building contractors.

The schedule contemplates mailings until the latter part of June, 1927, by which time twenty units will have been sent out.

Graphic presentation of the entire plan is shown in a chart giving the composition and mailing date of every unit.

A. O. B. A. Co-operates with Underwriters' Laboratories

The appointment of a special committee, composed of L. H. Van Ness, chairman, Edwin M. Fleischmann, J. E. Martin and Walter W. Williams, for the purpose of maintaining close co-operation between oil-burner manufacturers and the Underwriters' Laboratories, in connection with tests of oil burners and equipment, will go far to iron out the small difficulties that have come up in the past, largely on account of the tremendous increase in the number of burners submitted for tests. The committee, through its chairman, expresses a desire to accept suggestions for changes that may be beneficial to the industry in connection with the securing of listings by the Underwriters.

Association Acts to Secure Co-operation of Boiler Manufacturers

Manufacturers of heating boilers have been requested by the A.O.B.A. to assist the oil-burner industry by indicating the sizes, types or models of their boilers which are particularly adapted to the use of oil for fuel. It is expected that this co-operation will develop much interesting data on this important point.

New Members

The board of directors of the A.O.B.A. announces favorable action on the following applications for membership:

Williams Oil-O-Matic Heating Corp., Bloomington, Ill.

Winslow Boiler and Engineering Co., 208 South LaSalle St., Chicago, Ill.

Grant Oil Burner Corp., 50 Church St., New York.

The Monitor Furnace Co., Woodrow St., Cincinnati, O.

Westinghouse Electric & Mfg. Co., Page Boulevard, East Springfield, Mass.

Bryan Steam Corp., P. O. Box 285, Peru, Ind.

Teesdale Mfg. Co., 427 Market Ave., S. W., Grand Rapids, Mich.

Chrobaltic Tool Co., 1501 Ferry Ave., Detroit, Mich.

Kellog Manufacturing Co., 97 Humboldt St., Rochester, N. Y.

Liquidometer Co., 173 Thomas Ave., Long Island City, N. Y.

Make the Most of the Remaining Red-Letter Days

The Red Letter Days, extending from November 15 to December 24, inclusive, and advocated by the T.E.B. as the time in which the plumbing and heating trades should do a little holiday business, are rapidly drawing to a close. While there is still time to do something along this line even now, it would be interesting to know how much you, personally and in your business, have helped this idea and how much response you have received.

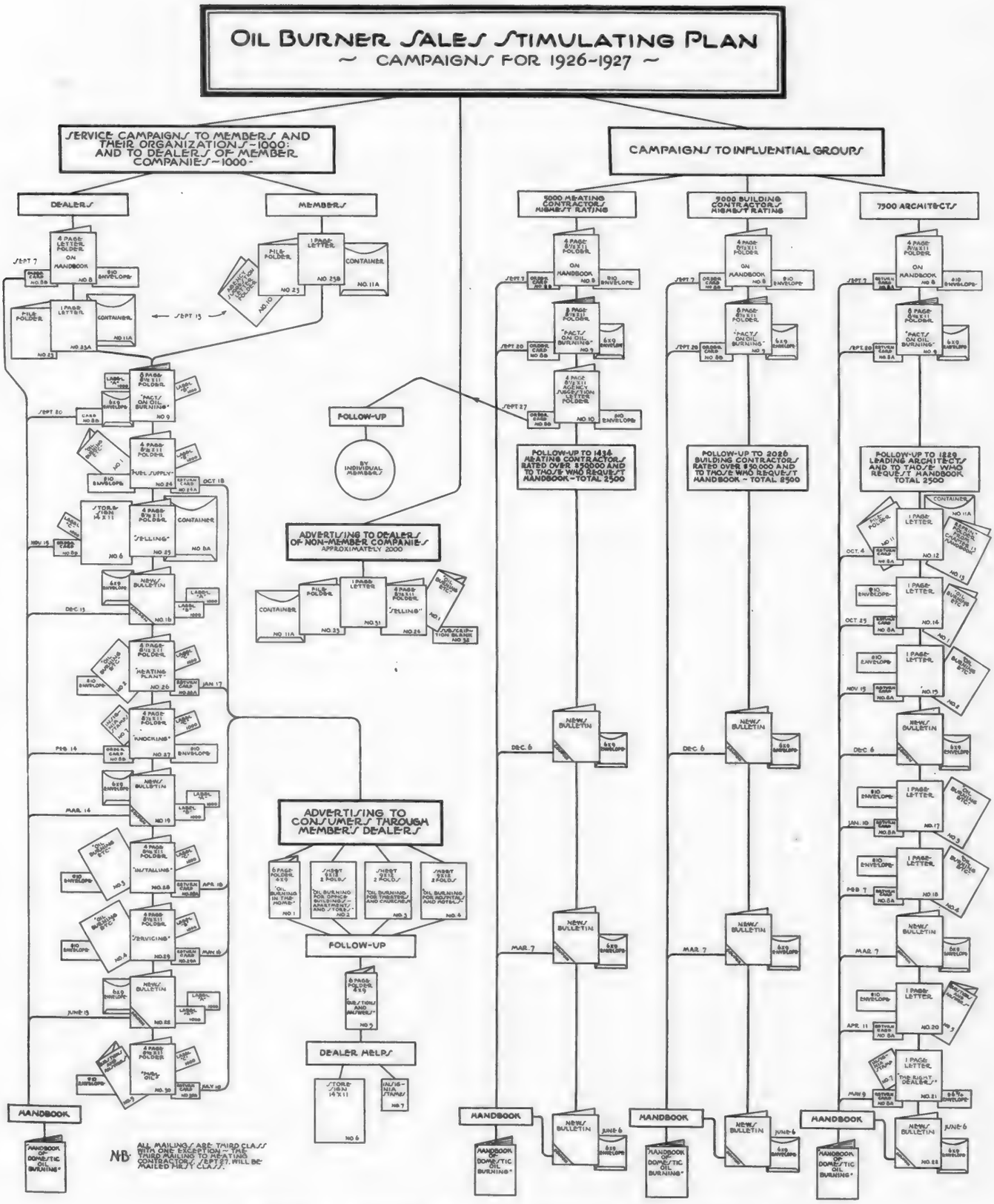

OIL BURNER SALES STIMULATING PLAN
~ CAMPAIGNS FOR 1926-1927 ~
SERVICE CAMPAIGNS TO MEMBERS AND THEIR ORGANIZATIONS-1000: AND TO DEALERS OF MEMBER COMPANIES-1000-
CAMPAIGNS TO INFLUENTIAL GROUPS
DEALERS
MEMBERS
5000 HEATING CONTRACTORS, HIGHEST RATING
9000 BUILDING CONTRACTORS, HIGHEST RATING
7500 ARCHITECTS
FOLLOW-UP
BY INDIVIDUAL MEMBERS
ADVERTISING TO DEALERS OF NON-MEMBER COMPANIES
APPROXIMATELY 2000
POLLOW-UP TO 1434 HEATING CONTRACTORS RATED OVER $50000 AND TO THOSE WHO REQUEST HANDBOOK - TOTAL 2500
POLLOW-UP TO 2026 BUILDING CONTRACTORS RATED OVER $50,000 AND TO THOSE WHO REQUEST HANDBOOK - TOTAL 8500
POLLOW-UP TO 1229 LEADING ARCHITECTS AND TO THOSE WHO REQUEST HANDBOOK TOTAL 2500
ADVERTISING TO CONSUMERS THROUGH MEMBERS DEALERS
FOLLOW-UP
DEALER HELPS
HANDBOOK
NB ALL MAILINGS ARE THIRD CLASS WITH ONE EXCEPTION - THE THIRD MAILING TO HEATING CONTRACTORS (SEPT 27) WILL BE MAILED FIRST CLASS.

Diagram of American Oil Burner Association's Sales Campaign

Ancient Oil-Burner Literature

There has just come to light an interesting example of early oil-burner literature, the first catalog describing what is now known as the NoKol burner, but designated in this literature as the Doble-Detroit system. As far as available information shows, this is the first oil-burner catalog descriptive of an automatically-controlled domestic oil burner. It will be remembered that the present-day NoKol burner is the development of the essential heat-producing parts of the Doble-Detroit steam automobile, which caused quite a furore at the 1917 automobile show.

The cover of the catalog bears the slogan, "Don't Worry About Coal" as it came out about the time of one of the notorious shortages of domestic fuel. As a matter of record, the Doble-Detroit factory was unable to secure its supply of steam coal and as a temporary expediency, its boilers were fired with NoKol burners hastily installed. The cover on the catalog contains a representation of a coal and wood yard and across the door of the office is nailed a sign, "No Coal."

It is interesting to conjecture if the present name of the burner might not have been developed from the idea suggested by this cover. The text of the catalog is surprisingly like the literature of to-day and the burner itself, in its early stages, would be very easily recognized, by anyone familiar with present-day burners, such as the NoKol.

1916 Installation of Doble-Detroit Oil Burner, the Forerunner of Nokol

The most radical departure from present-day ideas is the statement occupying an entire page that "the Doble-Detroit System Burns Liquid Fuel in an Atomized Condition—The Fuel is Not Vaporized into Gas."

A diagrammatic view of the installation of the burner shows the use of an ordinary drop-cord connecting the motor to a lamp outlet, which possibly was standard practice in that day, although a photograph of an installation in a Detroit home shows a more conventional method of running the wire in conduit. In this installation, the control is through a spring motor mounted on the wall above the burner and actuated by the living-room thermostat.

Considering the tremendously rapid advances in the art of domestic oil-burning during the past two or three years, this catalog seems to go back almost to the Garden-of-Eden time.

Cover Design of First Catalog on What is now Known as the NoKol Burner

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Economic Waste in Multiple Tenders

Too many bidders figuring the same contract and the economic loss occasioned thereby has been the subject of many discussions. The practice, however, seems to be going on just as strongly as ever, with the resulting waste in proportion. Just suppose, for a moment an extreme case of every contractor in the country figuring and putting in a tender for every job in the country. Truly, this is an extreme and impractical supposition, but having 15 bidders on a small-sized job is proportionately just as extreme and should be just as impractical.

Experts representing the Federated American Engineering Society and headed by Herbert Hoover recently undertook a survey of six typical American industries, and their findings indicate a preventable waste ranging from

29% to 64%, or an average of 46%. This is almost half of the total effort put forth and represents something like $10,000,000,000 per year.

A typical instance is quoted by the *Pacific Plumbing and Heating Journal* where 15 bidders presented tenders on a heating and ventilating job amounting to about $30,000. Assuming each bidder spent—including all his expenses—about $100 to arrive at his price, the total cost of figuring the work amounted to $1500, whereas if the figuring had been left to three or four firms the cost would have been only $300 or $400.

There is no doubt that several contractors should compete on each contract, but where is the number going to end? Surely, four to six tenders should be sufficient for any ordinary piece of work. And the public really pays the bill for the extra overhead, for estimating must be charged somewhere unless the contractor is going to go "broke."

Oil Burner Makes Hay in Eight Hours

An interesting adaptation of the oil burner has been developed at the Agricultural Experiment Station at Purdue University, and was fabricated by Games Slayter of LaFayette, Ind.

The equipment is mounted on wheels for easy transportation, and consists essentially of a cylindrical combustion chamber, and a suction fan operated by the motor of the tractor that provides mobility for the equipment. The fan is designed to handle 7000 cu. ft. per minute effectively against a rather high resistance. The combustion chamber is lined with refractory brick. Oil is fed to the combustion chamber by a gear pump, at pressures between 30 lbs. and 80 lbs.

A large volume of excess air is purposely supplied to the burner, insuring a high degree of combustion and reducing the temperature of the products of combustion to about 200° F. This temperature has proved suitable for making hay or drying soy beans unless it is desired to germinate the seeds, when 140° F. must not be exceeded.

A crib, which may be built up of fence rails, or composed of posts set in a circle with wire around and across the top, is heaped with the green hay, and the warm air is blown into the crib from which it passes through the entire stack. A slight trace of soot may be found on the hay nearest the crib, but the cows of the famous Purdue herd appeared to prefer this to sun-dried hay, when offered a choice.

A stack of green alfalfa, cut early in the morning was cured in eight hours, at a fuel cost of $6.00, for both burner and tractor.

Progress of Second National Heating and Ventilating Exposition

In connection with the forthcoming Second National Heating and Ventilating Exposition, to be held March 14-19, 1927, at the Twelfth Regiment Armory, New York, the National Exposition Company, Inc., which is behind the exposition, has issued a folder entitled, "Truth About the Heating and Ventilating Exposition." This folder is dated May 5 and states that the first National Heating and Ventilating Exposition closed with results gratifying to the exhibitors who participated therein. It further states that the second exposition is going forward as scheduled, under the same management, of which Harry A. Cochrane is president and E. P. Frenz, business manager. Many of the exhibitors, it is stated, have already reserved space for the next exposition.

Permanent headquarters of the Allied Heating and Ventilating Exhibitors' Association, under whose auspices this exposition will be held, are in Suite 334, Hotel McAlpin, New York, and the management was and will be aided in the conduct of this exposition by an advisory committee made up of members of the Allied Heating and Ventilating Exhibitors' Association.

Before going into the 1926 exposition, states the folder, a survey was conducted, including interviews with all prospective exhibitors, asking their opinions as to the value of the exposition. The balance of the folder is taken up with expressions of co-operation and approval from the exhibitors themselves.

Heating Water with Oil

At the monthly luncheon and meeting of the Chicago Oil Burner Association, held at the Allerton Club, Chicago, November 19, the speaker of the meeting, R. E. Moore, of the Excelso Specialty Works, Inc., took as his topic the "Heating of Hot Water by Oil Burners." He gave several examples where this had been accomplished at a small cost.

Top—Oil Burner Drying Hay at Lafayette, Ind.

Left—Method of Introducing Hot Combustion Gases into Material.

Underwriters Analyze Oil-Burner Fires

First Official Study of Causes and Results of "Fires" Throughout the Country Disproves Oil-Burner Menace

THE first specific study of the fire risks involved in the installation of domestic oil burners, made by the National Board of Fire Underwriters, based upon "oil-burner fires" reported by insurance patrols, is presented to the readers of THE HEATING AND VENTILATING MAGAZINE through the courtesy of the executive officials responsible for the survey.

The term "oil-burner fire" is used throughout to designate a report occasioned through the mal-operation of an oil burner, although in many cases there was no actual fire. The heaviest loss reported, due to both fire and smoke, was but $15,000. This might be said to represent but a single average house—an insignificant loss, taking into account the thousands of homes heated with oil.

The study covered 173 "fires" occurring throughout the United States during the period from November 10, 1925 to May 15, 1926, only such fires were analyzed as had been reported on blanks furnished for the purpose, or where definite reports by qualified representatives could be obtained.

This naturally limits the reports to the larger cities where insurance patrols are maintained, but as these cities cover practically the entire United States, the data may be taken as typical.

Obviously, then, this list does not include all oil-burner fire losses during the heating season, as many doubtless occurred under such conditions as did not allow of accurate reports as to cause and loss.

In cases where losses seemed large, from newspaper accounts or otherwise, an effort was made to check the report. An instance of the grossly-exaggerated items frequently seen in daily papers is afforded as the result of a fire in an eastern city where the newspapers reported that the "explosion" had done not only grave damage to property, but had caused serious injury to several persons. The far-reaching effect of the spreading of such erroneous information is seen in a news item published in a New York daily paper, based on a report from Atlantic City.

(After this article was in type, it was found that a coal merchant in Montclair, N. J., had paid to have a newspaper report of this fire reprinted in his local paper. Although marked "Adv." at the end, this purports to be a news story, and this coal dealer is consequently spending his money to spread misinformation regarding oil burner risks instead of to sell his coal.

When this story was read over the 'phone to the Chief of the Fire Department of Atlantic City, he laughed and characterized it as "bunk all through." The "$10,000" loss was, he said, in reality, a few hundred.

It might be added that the oil burner is still being used).

Asked for the facts regarding this fire, the local fire chief wrote that "the newspapers exaggerated the extent of damage and the casualties—which consisted only of damage to the boiler and elevator shaft, and the only person injured was a young man who was working on top of the boiler—and after being taken to the hospital for observation returned shortly."

Another important point to be brought out is that the burner installed in this apartment heating plant is *not a domestic type*, but a manually-operated burner.

Another instance of such misinformation being spread by the press was in connection with a bad fire in a residence in New York City where an aged doctor and his wife, it was stated, were burned to death by an oil-burner fire—at least that was the story carried in many of the New York papers, and, through publication, spread throughout the country. An investigation proved that there had not been an oil burner installed in the entire block.

It is to be understood that the tabulation of reported fires was made by the engineers of the National Board of Fire Underwriters, while the following com-

TABULATION OF OIL BURNER FIRES REPORTED BY INSURANCE PATROLS

Causes of Fire or Smoke Damage	No. of Occurances Due To Ea. Cause	Character of Installation			Extent of Loss					Type of Burner				Method of Burner Feed			
		In Accord with N.B. Regulation	Not in Accord with N.B. Reg.	Not Indicated	Small Smoke Loss	Small Fire Loss	Small S&F Loss	No Loss	Loss Not Stated	Appr'd	Not Appr'd	Home Made	Not Stated	Pump	Gravity	Pressure (Air)	Not Stated
Failure of Auto. Shut-off Valve	39	13	18	9	9	3	3*	17	8	21	16	1	2	14	21	—	5
Carbonization	18	7	5	6	2	—	—	7	8	8	10	—	—	8	9	1	—
Defective Burner	16	3	3	7	2	1	1	6	6	2	5	—	9	3	9	—	4
Loose Connections, Leaky Piping	26	11	12	3	10	4	3	7	2	8	17	1	—	15	11	—	3
Imperfect Combustion	9	2	1	6	1	—	—	8	—	7	2	—	—	3	6	—	—
Rubber Hose for Gas Pilot Light	2	—	2	—	—	—	1	—	1	2	—	—	—	1	1	—	—
Insufficient Draught	2	—	—	2	—	—	—	—	2	1	1	—	—	2	—	—	—
Rubbish near Boiler Ignited.... from Furnace Heat	1	—	1	—	—	—	1	—	—	—	1	—	—	1	—	—	—
Gasoline as Floor Cleaner.... ....Ignited by Burner	1	—	1	—	—	—	—	1	—	1	—	—	—	—	1	—	—
Absence of Auto. Shut-off Valve	10	—	10	—	—	3	1	5	1	—	5	2	3	1	5	—	4
Drip from Motor..... ..... Ignited by Back Fire	1	—	—	1	—	—	1	—	—	1	—	—	—	—	1	—	—
Back Fire Due to Closed Damper	4	1	3	—	1	—	1	—	2	3	—	—	1	2	2	—	—
Explosion in Combustion Chamber	2	—	—	2	—	—	1	—	1†	1	—	1	—	1	—	—	1
Unknown	5	2	1	—	1	—	—	4	1	2	3	—	—	2	1	2	—
Absence or Extinguishment.... ..... of Pilot Light	7	2	4	1	1	—	—	3	3	4	3	—	—	4	2	1	—
Improper Installation	4	—	3	1	1	—	1	—	2	1	3	—	—	1	2	—	1
Overheated Breeching or Flue	3	1	2	—	—	2	1	—	—	1	2	—	—	3	—	—	—
Overheated Furnace	4	—	3	—	—	1	1	—	2	—	2	2	—	1	3	—	—
Cracked Burner	1	1	—	—	—	—	1	—	—	—	1	—	—	—	1	—	—
Tank Overflow during Filling	2	—	2	—	1	—	—	—	1	1	1	—	—	1	1	—	—
Burning Oil in Comb. Chamber	1	—	1	—	—	—	—	—	1	1	—	—	—	—	—	—	1
Electric Short Circuit	1	—	—	1	—	—	—	—	1	—	1	—	—	1	—	—	—
Defective Burner Orifice	1	1	—	—	—	—	1	—	—	—	1	—	—	1	—	—	—
Clogged Feed Pipe	4	2	2	—	—	2	—	2	—	2	2	—	—	1	—	—	—
Water in Oil	1	—	1	—	—	—	1	—	—	—	1	—	—	—	1	—	—
Careless Operation	1	—	1	—	—	—	—	1	—	—	1	—	—	—	1	—	—
Dirty Flue	7	3	3	—	1	1	—	4	1	1	4	1	—	4	2	—	—
TOTAL	173	49	79	39	29	17	19	65	42	68	82	8	15	73	80	4	19

NOTE.... The above Figures are Based on Fire Reports for Winter Season, Nov. 10, 1925 - May 15, 1926.

* Heavy Loss, Fire and Smoke, $15,000.
† Two Alarm Fire. Loss not Indicated

Of the 74 fires from other causes, 10 were the results of *absence* of an automatic shut-off valve; in other words, the burners were not "listed." Seven fires resulted from the absence of or extinguishment of a pilot light, and the other 57 varieties were the result of twenty different causes. Nine fires resulted from imperfect combustion, an inconsequential number when it is considered how many cheap, home-made and unstable atmospheric burners are in operation.

BOILER BLOWS UP IN HOUSE.

Youth Is Injured and Several Are Hurled to the Floor by Atlantic City Explosion.

Atlantic City, N. J., Nov. 3.—One woman was hurled from her bed, two others were thrown to the floor and Oliver Steen, eighteen years old, of Ventnor, was sent to the City Hospital as a result of the explosion of an oil-burning boiler in the basement of the Bert Luner apartments, at Virginia and Atlantic avenues, early today. An elevator was wrecked and the entire basement damaged.

Steen and Augustus Doughty, who lives in the apartment, were at work re-covering the boiler with asbestos when the blast occurred. It was attributed to a back-fire. The boiler room adjoined the elevator shaft and the latter was wrecked. Fortunately there was no one in the elevator at the time.

Mrs. Virginia Johnson, mother of Enoch L. Johnson, county Republican leader, occupies an apartment on the first floor, almost directly over the boiler room. She was hurled out of bed by the force of the impact of the hurtling timbers and the iron work against the ceiling of the basement.

Mr. Doughty, wife of the repair man, who escaped injury, was seated on a rocker carrying on a long distance telephone conversation when the shock of the explosion hurled her to the floor, where she lay stunned for several minutes. Mrs. Sarah Ryan, also a first floor tenant, was putting dishes in a china closet when she was hurled off her feet. Firemen were called out, but there was little for them to do. The damage was placed at $10,000.—From N. Y. Times, Nov. 4th.—Adv.

This "Oil Burner Fire" Story Was Used as Advertising by a Coal Dealer to Increase Coal Sales

POOR INSTALLATION INVITES FIRES

Where installations were not in accordance with the recommendations of the Underwriters, 78 fires were caused, as against 49 where the installations were correct in type. However, the items listed under the head "loose connections—leaky piping", 11 in one case and 12 in the other, prove conclusively that, no matter how many regulations are "followed" *careless workmanship* constitutes a serious risk.

A classification of losses is interesting. Almost 40% of all the fires were listed as "no loss." In one-quarter of the reports the loss was not stated. One was a "two-alarm" fire, with no loss stated. Thirty-five percent of the fires were listed "small smoke loss", "small fire loss" or "small fire and smoke loss".

Several points stand out as this table is studied. In the first place, the available authentic data indicate that the fire risk, where an oil burner is carefully installed in accordance with accepted practice, is so slight as to be practically negligible. No one has the remotest idea of the number of oil burners in operation to-day, including those manufactured by the more important manufacturers and "listed", those built by the smaller producers, many being put together in sheds or in the back part of plumbing shops, and those "cobbled," together by Mr. Handyman.

It appears that the time may shortly come when an official statement by the Underwriters' officials, based upon facts, can be made that will place the oil burner, as a risk, on a par with the anthracite-fired heating plant, and decidedly below that of the bituminous-fired boiler or furnace.

Dr. Hill on Road to Recovery

Dr. E. Vernon Hill's many friends in the industry will be pleased to know that he is well on the way to recovery from his recent illness, which confined him to the hospital for over three months.

Dr. Hill's illness began while at the Lexington meeting of the American Society of Heating and Ventilating Engineers last summer and developed into a carbuncle on the back of his neck. The carbuncle rapidly spread and several operations were required, which necessitated hospital treatment.

Following the carbuncle, a number of abscesses formed in both eyes, leaving Dr. Hill without sight for several weeks. These, however, have now entirely cleared up and although he is still in a weakened condition, he is able to be in his office an hour or so each day.

Dr. Hill's illness has brought a new realization, on the part of the industry, to his many contributions and years of service which have long since made him an outstanding figure in heating and ventilating engineering circles.

DEPARTMENT OF PUBLIC SAFETY

WILLIAM S. CUTHBERT, DIRECTOR OF PUBLIC SAFETY

JOHN J. BARNETT, CHIEF ENGINEER

BUREAU OF FIRE

Atlantic City, N.J. Nov. 9, 1926.

NOV 10 1926

NATIONAL BOARD OF FIRE UNDERWRITERS RECO

Geo. W. Booth, Chief Engineer,
National Board of Fire Underwriters,
85 John Street, New York, N.Y.

Dear Mr. Booth:

The Automatic Oil Burner installed at the Berthumel Apartments, 15 S. Virginia Avenue is the Oil Burner and has been in service about three years.

On November 3, 1926, we had a call to the above address and on our arrival found there had been an explosion in this oil burning heater but no fire resulted from the explosion.

The newspapers exaggerated the extent of the damage and the casualties due to this explosion which consisted only of damage to the boiler and elevator shaft and the only person injured as a result of the explosion was a young man who was working on the top of the boiler when the explosion occurred and after being taken to the hospital for observation returned shortly.

From reports received from a Mr. Kelly, Engineer of the plant, the motor was not in good condition and his theory is that the motor went dead causing the flame to be extinguished and the flow of oil constantly on the hot bricks caused the explosion.

For your information I might addthat the old job did not have a pilot light but the new job is equipped with one and has also a new motor.

With kindest personal regards to you, I am,

Very truly yours,

Chief of Fire Department.

What the Chief of the Atlantic City Fire Department Had to Say About the "Oil Burner Fire" Story Reproduced on this Page

Comparison of Gas Heating Equipment with Conversions

In a section of the House-Heating Report presented to the American Gas Association at its recent convention in Atlantic City, F. M. Rosenkrans, of Henry L. Doherty & Company, Kansas City, Mo., discusses the value and desirability of conversion compared with especially-designed gas heating equipment. House heating with gas, he states, offers to the industry one of the greatest fields for gas in the future and gas companies now are generally becoming very active in entering this field. The present difficulties which are encountered in promoting the house heating load are not in selling the public on the merits of heating with gas, but the difficulties are in selling to the public the equipment necessary to efficiently and automatically utilize this wonderful fuel, and in selling the margins of cost difference between heating with gas and heating with other fuels, whatever the amount may be.

It is generally conceded by those who have had any experience with the problems of gas house heating, that the ideal installation is the gas-designed, central, house heating plant. The properly selected and installed gas-designed equipment insures the lowest operating cost with adequate service, safety, and convenience.

The homes of this country are now furnaced with coal-designed equipment, which in the aggregate represents a tremendous investment. The replacement of this coal-designed equipment with a gas-designed, house heating plant represents one of the big obstacles which is encountered in the promotion of the house heating load. It is natural for the customer to make inquiry as to installing gas-conversion equipment in his present coal heating plant, which in many cases he considers good, and eliminate the large, initial investment which he is called upon to make when gas-designed equipment is installed in place of his present coal furnace.

The promotion of the house heating load is a selling job. The sooner ways and means are devised for removing some of the barriers which make the selling of house heating difficult, the sooner the gas companies will secure their share of this great potential house heating load.

FEATURES FAVORING CONVERSIONS IN LOAD BUILDING

In the consideration of conversion installations, there appear to be features which favor their use in a general house heating program that would enable gas companies to attach heating business much more rapidly than when gas-designed, house heating equipment alone is to be sold. These features have been recognized by gas companies and there are few companies, who have entered the heating field, who have not at some time or other discussed the conversion problem. Due to the difficulties encountered with equipment and in the securing of efficiencies which approach gas-designed equipment, the majority of manufactured-gas companies now confine their efforts to selling gas-designed, central, house heating plants.

In this paper endeavor will be made to discuss the features and conditions which favor including conversion installations in a general house heating program, and some of the complicated problems which are encountered in the efforts to successfully convert coal furnaces. The following are some of the features and conditions which favor consideration of conversion installations:

1. LOW INITIAL COST OF CONVERSIONS AS A MEANS OF LOAD BUILDING

The value of a conversion job in comparison with gas-designed, house heating equipment is largely a matter of price consideration. As is general with all types of domestic appliances, the bulk of the high priced appliances are sold to those customers who are in good financial circumstances. In view of securing the maximum house heating load, all classes of customers must be reached. The classifications of customers who can be reached through the medium of conversion apparatus are:

(a) The wage earner who owns his own home but feels he cannot afford the investment of a gas-designed furnace to replace his present heating plant.

(b) The renter who desires equipment of low cost, which is durable and capable of being conveniently reinstalled.

(c) The customer who is unwilling to make the large initial investment in gas-designed apparatus and dispense with a present good coal furnace.

2. CONVERSIONS AS A MEANS OF SELLING GAS-DESIGNED EQUIPMENT

The conversion of present coal furnaces to gas is one means of eventually selling gas-designed equipment. After a season's experience with the merits of gas heating through conversion apparatus which required a small investment on the part of the customer, many customers can be sold the gas-designed installations to replace the conversions, as it is not hard to point to further service and economies which can be secured through the gas furnace.

3. COMPARATIVE COSTS

Special house heating rates which have been instituted by many gas companies, have brought operating costs to a level where gas customers can be sold automatic house heating service. Through the medium of good conversions, included in a general house heating program, gas companies would be able to offer automatic heating service somewhat comparable in operating costs with low investment expense on the part of the customer. With high-class conversions, efficiencies are approached within ten or fifteen per cent of the average gas-designed equipment. When the features of gas heating are carefully considered, the customer is often willing to pay the margin of increased cost, although greater than with a gas-designed furnace, for the opportunity of satisfying himself on the feasibility of gas house heating with a small investment which would not disturb the present coal plant.

PROBLEMS ENCOUNTERED IN CONVERSIONS

The problem of successfully converting coal furnaces with appliances to burn gas is complicated often under favorable circumstances. Many successful conversion installations have been reported and efficiencies indicated which approach the efficiencies of gas-designed equipment, but such efficiencies are not the average secured under all conditions. The big factor which has prevented the general adoption of conversion installations in general house heating programs has been the lower efficiencies secured, compared to gas-designed equipment, with resultant higher gas bills received by the customer. This factor may be largely due to the lack of suitable conversion equipment which combines the features of high efficiency in gas application, and flexibility in installation and application to various furnace sizes.

Those who have attempted to devise conversion apparatus have been confronted with the following problems in making successful conversions:

1. To devise equipment to cover factors and principles used in the original design of coal equipment. Coal equipment is designed to make use of the radiant heat of the coal bed and the convected heating effects of burning coal; a large combustion space is usually provided in addition to the firepot for holding the coal.

2. The shortness of hot-gas travel before the flue is reached. The hot-gas flues in coal furnaces are usually short and large, in order to take care of soot conditions which are always attendant with burning coal, and to provide little resistance to the draft pull of the chimney on the fuel bed.

3. Erratic draft conditions due to wind and location of chimneys. The chimney flue of a coal furnace is usually large and no provision has been made to take care of the erratic draft conditions due to wind and chimney location. In gas-designed equipment, effort is always made to provide a uniform draft through the use of draft hoods.

4. Undersized or improperly designed heating installations encountered. Many homes are underfurnaced and it is not unusual to encounter poorly designed

coal heating plants. Only poor results can be expected from conversion apparatus installed in such coal heating plants encountered.

REQUIREMENTS OF A GOOD CONVERSION

Many kinds and types of conversion equipment are found on the market and a number of gas companies have made an effort to devise equipment of their own. The equipment which is usually found on the market is sold in natural gas territories, where the price of gas is very low. In the many kinds and types of conversions found, some incorporate no features which tend to improve efficiencies, while others incorporate one or more combinations of features which tend to improve the conversion installation.

Some of the requirements which a good conversion installation should meet might be briefly stated as follows:

1. Low initial cost.
2. Low service cost.
3. Good efficiency in application of gas.
4. Average long life.
5. Installation flexible in application to various furnace sizes.
6. Flexibility in adjustment of equipment to the predetermined maximum hourly gas-demand requirement for a given installation.
7. Adaptable as to pilot and automatic control.
8. Combustion good on close secondary air control.

Some work has been carried on by several organizations during the past year in the development of conversion apparatus, and indications are that considerable progress has been made in fulfilling the above requirements.

It appears from the results of recent investigations and experiments that the most efficient conversion installations make use of the well-known principles of radiant heat as well as the convected heat of the burned gases. Through the use of radiant heat, the fire box and dome of the coal designed furnace are heated in the same manner as the radiant heat derived from a coal bed, which results in greater heating effects on the furnace castings than any other application of gas with resultant higher efficiencies. The efficiencies of the radiant type of conversion apparatus appear to be less affected by over-ventilation than other types.

Where the demand rate system is used in connection with a house heating program, it is absolutely essential that the conversion equipment be so designed that adjustment settings can be made to the predetermined maximum hourly gas-demand requirement to be used for a given installation. If the burner cannot be set for a given predetermined maximum demand, the customer can on the colder days take a larger demand than is consistent in heating his home, resulting in greatly lowering the efficiencies of the conversion installation and the jeopardizing of general service where a large number of such type of conversion installations are made. Whether or not a demand rate system is used, the feature of adjustment of burners to a predetermined maximum hourly gas requirement for a given installation appears very desirable.

In case a gas company adopts the policy of including conversion installations in a general house heating program, the company should make every effort to secure control of the sale of conversion installations. It is only by this means that conversions will be made which function satisfactorily, and good average efficiencies and results be secured.

The value of including the sale of conversion installations in a general house heating program is the ability to reach those customers who cannot be initially sold the gas-designed furnace, through the medium of equipment applicable to the present coal heating plant. Thus the field of house heating sales is enlarged and assistance is rendered in removing one of the barriers in rapidly promoting this load.

The main factor which has prevented adoption by manufactured-gas companies of conversion installations, in a general program, has been the lower efficiencies secured in gas application and the resultant higher gas bills to the customer. Suitable equipment has been lacking which combines efficiencies in gas application approaching the gas-designed equipment, and flexibility in installation and in application to various furnace sizes.

In the last analysis, the development of the house heating load is a selling problem. The matter of conversions in this connection deserves serious consideration. Through the development of good conversion apparatus, great assistance will be rendered in expanding the sale of house heating and gas companies will reap the reward in the more rapid addition of this load.

GAS COMPANIES PROMOTING HOUSE HEATING

A partial list is given in the report of gas companies which are making active efforts to promote house heating by gas. The report concludes with a very complete bibliography of house heating with gas.

International Conference on Bituminous Coal Produces Important Data

Over 1500 individuals interested in the use of bituminous coal in the industrial world gathered in Pittsburgh, November 15-18, and crowded the four days with morning, afternoon and evening sessions, at which over 43 technical papers were presented dealing with various aspects of the utilization of bituminous coal. Noted technicians from ten foreign countries attended the meeting and contributed to its success. The papers and discussions dealt largely with the production and utilization of by-products of bituminous coal and of its carbonization and some of the groups went further and discussed the related problems of smoke prevention, recovery of waste heat and mine-mouth power generation.

Practically none of the papers or discussions had a direct bearing upon the domestic utilization of coal, although an interesting statement was made by Osborne Monnett, consulting engineer of Chicago. He stated that even with an intensive campaign of education, it would require a generation to bring the average householder where he would properly handle bituminous coal in domestic heating apparatus.

Many new developments were brought to the attention of the conference, particularly in regard to the production of oils of various characteristics directly from coal. Plants for this purpose are already established in Europe and there are other constructions at the present time in Germany, including two plants with a total capacity of over 1,000,000 bbls. of oil products per year.

American Petroleum Institute Discusses Oil Burning at Annual Meeting

At the seventh annual meeting of the A.P.I., held at Tulsa, Okla., December 7-8-9, oil burning, both domestic and industrial, came in for no small part on the program. A separate group session was held in co-operation with the American Oil Burner Association for the purpose of discussing oil burning in its various phases. Lionel L. Jacobs, president of the American Oil Burner Association, spoke on "The Oil Burner Situation." "Making Fuels for Industrial and Domestic Oil Burners" was the subject of a paper by H. W. Camp, general superintendent of the Empire Refineries, and E. H. Peabody, president of the Peabody Engineering Corporation, presented a paper on "Burning Oil Under Stills and Boilers."

The increasing consumption of oil fuel for domestic heating is naturally attracting the attention of the petroleum industry and the close co-operation between the A.P.I. and the A.O.B.A. is assurance that the more important problems facing both industries will be worked out to the mutual advantage of both parties as rapidly as possible.

Palmer House Heating Equipment

Through a typographical error, in last month's issue, in the article on the Palmer House in Chicago the cost of the hotel was given at $2,000,000, instead of $20,000,000. In Fig. 7, the radiation marked pressed steel should have been designated as cast-iron, the pressed steel referring to the bracket only.

Grates for Burning Small-Sized Anthracite

Previous articles in this series are as follows:

1.—*Neemes, October*, 1926.
2.—*Johnson, November*, 1926.
3.—*Rath, November*, 1926.

4—Pyramid

THE Pyramid grate, manufactured by the Pyramid Iron Products Corporation, 136 Liberty Street, New York, is described as different in principle and design from any other type of grate bar. Its construction is such as to provide a large air space and, at the same time, prevent the smallest coals from sifting through. The design permits a diffused air delivery in almost a horizontal direction and the construction enables the air to reach the firebed in a large volume at low velocity.

The Pyramid grate is made in dumping, shaking and stationary types for both rectangular and circular fireboxes. Either type can readily be installed in any furnace. Where the natural draft is insufficient to permit proper burning of the smaller sizes of coal, a complete forced-draft system is furnished with the grate, consisting of a multivane low-pressure type blower, direct connected to a slow-speed motor. Automatic control of the motor is obtained by means of a pressure regulator, which is adjustable to operate the motor within a desired range of steam pressure.

Practically every type of boiler, it is stated, is adaptable to this type of grate.

The following examples bring out quite clearly the savings made possible in burning the small sizes of anthracite coal, and it is interesting to note that not only are these savings effected through the decreased cost of the coal, but also in the smaller tonnage burned.

Building	Year	WITH FORMER GRATES Tons Burned	Cost	WITH PYRAMID GRATES Tons Burned	Cost	SAVING
High School	1923-24	250 (Egg)	$3375.00			
Rutherford, N. J.	1924-25			190 (Rice)	$1045.00	$2330.00
Carteret Club	1923-24	201 (Egg)	2859.49			
Jersey City, N. J.	1924-25			156 (Rice)	993.78	1866.71
Wm. A. White	1923-24	192 (Pea)	1920.00			
353 5th Ave.	1924-25			130 (Rice)	702.00	1218.00

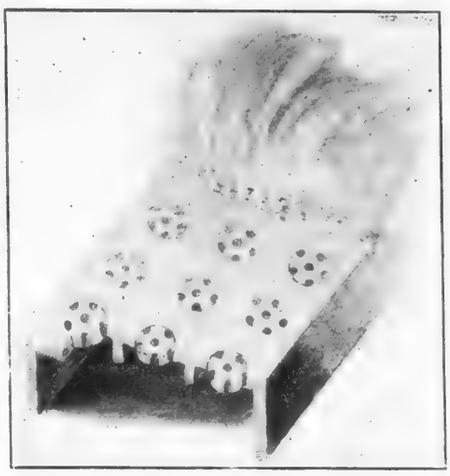
5—Culm Burn

AN equipment designed to meet the requirements for burning the small sizes of anthracite, especially rice and barley or even low-grade screenings, is that manufactured by the Culm-Burn Equipment Co., Philadelphia, Pa. Wolff & Munier, Inc., 222 East 41st Street, are the New York City representatives.

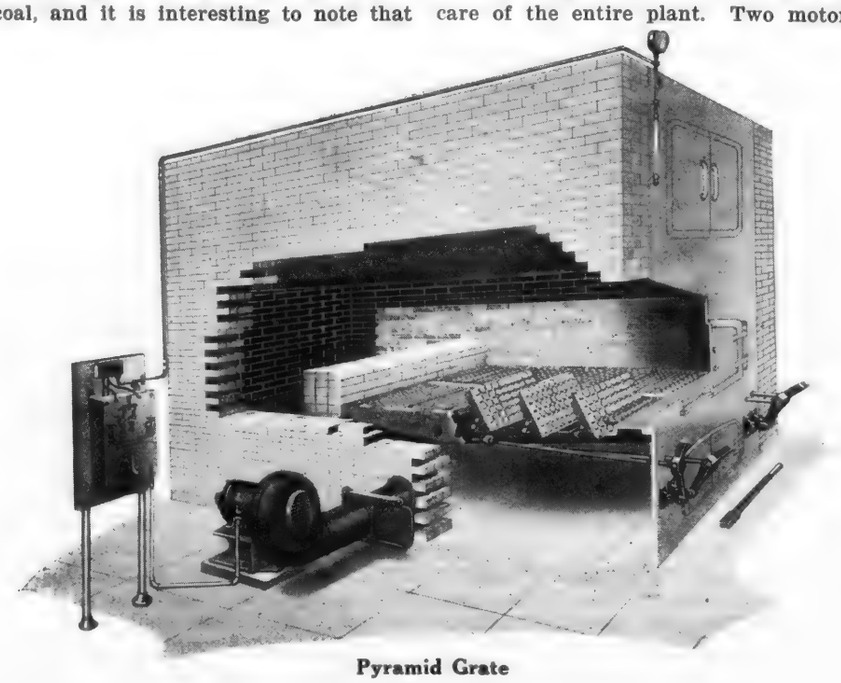
THREE CLASSES OF GRATES

The equipment consists of one of the three kinds of Culm-Burn grates: water cooled, in which the grates are cooled by means of water circulation; air cooled, in which the grates are cooled by means of air forced through the grates and afterwards mixed with the burning gases by means of a distributor box placed in the bridge wall of boiler; and dry grates, which are made up in sections 6-in. wide and of suitable length for the various kinds of boilers.

The equipment also includes direct-connected blowers, in duplicate, either blower being of sufficient size to take care of the entire plant. Two motors with variable-speed control are used, if direct, two or three-phase alternating current; and constant speed with automatic cut-out switch, if the current is single-phase alternating. Balance draft gauges are included, also direct-reading gauges if more than one boiler is in the battery. Either thermostatic or pressure control is supplied for air and damper regulation. Slate instrument board is furnished on which is mounted switches and other instruments. All air ducts are specially made of No. 20 G.I. with two coats of damp-proof paint. Heavier iron is used for butterfly dampers and blast gates. Electric wires are run through conduits.



Detail of Culm-Burn Grate

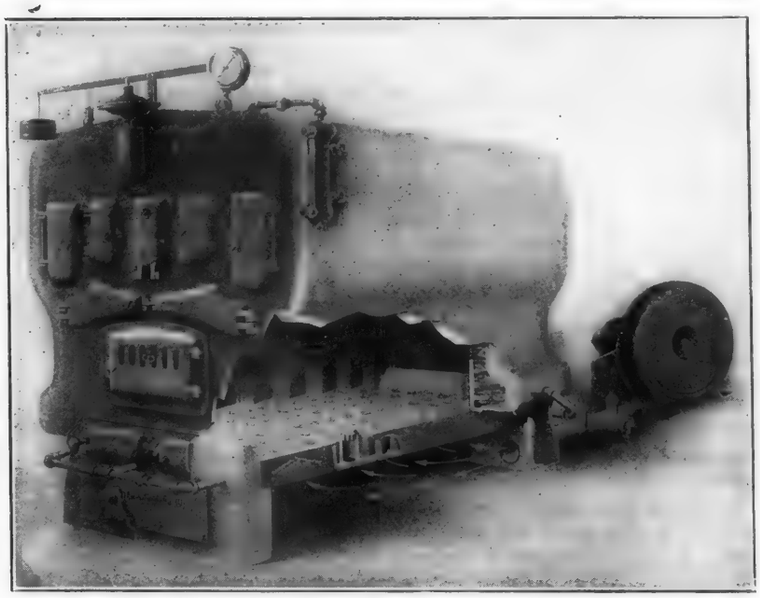


Pyramid Grate

DRY GRATES

The ash pit is sealed up and air is forced into it by direct-connected, electrically-driven blowers, in a manner to provide an even distribution of pressure under the entire surface of the grate. The accompanying illustration shows a section of the dry grate with round cores through which the air passes and discs through which the air is projected into the fuel bed. The air outlets are placed at such angles that the blasts from any two adjacent discs will meet at a point about 2 in. above the grate level. This is well below the center of any normal fire-bed, the purpose being to obtain an even fire with no "dead spots."

It will be noticed that the holes in the grate discs are tapered so that any



Culm-Burn Grate

small particles of dust getting into them will fall into the ash pit. Some dust falls through and it is necessary to remove this about once a year through the special clean-out door in the front. No difficulty, it is stated, has ever been experienced by the obstruction of these small holes.

On steam boilers the damper regulator is connected by a chain to a butterfly damper in the air duct from the blowers and may be set to reduce or cut off air supply at any desired steam pressure. This can be balanced so that the steam will be automatically regulated within a small pressure range. A balanced-draft gauge is installed over the fire to enable the fireman to set the smoke damper in the proper position to retain the maximum amount of heat in the boiler. In a similar manner, a thermostat can be used to regulate the air supply and so maintain any desired temperature in water heating systems.

QUALITY OF ASH

All ash is removed in the form of clinker. The high heat produced by the projection of the air into the fire bed fuses the ash directly over the discs and then over the whole bed of the fire and in doing so burns practically all the carbon from the coal. It does not freeze to the grate and is easily broken with a slice bar and removed with Culm-Burn tools through the fire door. In this way, it is not necessary to shake the grates with the consequent necessity of removing ashes from the pit. Tests indicate that Culm-Burn ash contains less than 5% unburned carbon where the normal furnace will run from 18% to 60%.

The equipment is guaranteed to produce equal efficiency, pound for pound, from grades of anthracite coal known as barley, rice or bird's eye as is now secured from the best grades of prepared sizes, the B.T.U. value and ash content being equal.

Advantages of Wetting Coal

By T. W. Reynolds

The practice of wetting fine coal* in the boiler room before firing is one which has obtained for a long period of time and yet, when inquiry is made of those who are most persistent in this practice, the reason advanced for it is generally different in each case. The elimination of dust and dirt while handling is, of course, a more or less logical result and, in some cases, a certain amount of soot prevention seems to be obtained by preventing the small dust-like particles of coal from being drawn up into the flues by the draft before they reach the fire bed.

Many attempts have been made to justify the practice of wetting down the coal and tests have even been made showing an increase in evaporation of 3% when water was added to an amount equalling 5% of the weight of the coal. The benefits derived are doubtless more physical than chemical in nature and, in the case of steam atomizers for oil burners, the action is purely mechanical, as the velocity of the steam jet gives a better mixture, therefore greater combustion of the gases in the furnace.

WHAT TAKES PLACE IN A FURNACE WITH WETTED COAL

Water consists of oxygen and hydrogen. Carbon of the coal, in combining with the oxygen, liberates and, under proper conditions, burns the hydrogen of the water. The heat required to separate the hydrogen from its combination with the oxygen is just as much as the heat afterwards given up by the burning of the hydrogen and may be more if the gases are chilled by striking the cooling surfaces before being completely combusted, or if there is insufficient air to burn them. As a consequence, there is no gain in heat from wetting the coal, as popularly supposed, at least in so far as this part of the action is concerned; if anything, there is a loss, as cited.

LOSS CAUSED BY WET COAL

In burning, the hydrogen is once more turned into water vapor (steam) and passes out the chimney, taking with it the heat lost from raising the temperature of the water to the boiling point, plus the latent heat required to evaporate the water into steam at atmospheric pressure, plus the heat required to superheat it to the temperature of the flue gases, and here we have a sure enough loss; that is, in the theoretical furnace efficiency. Furthermore, the steam tends to form a separating medium between the molecules of oxygen and those of the combustible gases, thus retarding combustion.

ADDITIONAL BENEFITS DUE TO WETTING THE COAL

On the other hand, it is held by some that a coking soft coal will coke more readily and give a better fire if the coal is wetted and that the heat lost by separating the hydrogen from the oxygen of the water is more than made up by better combustion when burning the longer blue flame of the hydrogen and carbonic oxide gases. It is also claimed that when fresh coal is added, choking off the air spaces, the hydrocarbon gases are not so rapidly distilled (due to the chilling action of evaporation from the wetted coal), but are held back a little, thus giving necessary contact with the air required for complete combustion. The oxygen liberated from the hydrogen is also said to combine more readily with the hydrocarbons than does atmospheric oxygen. Furthermore, the formation of clinkers is prevented, or at least made less troublesome, as they are softer and more easily broken up.

GOOD SOOT PREVENTATIVE

Be this as it may, the fact remains that the wetting of coal prevents, to a great extent, the accumulation of soot and the possibility of chimney fires therefrom. The idea is offered as a help in this direction, with the added thought that under some conditions there may be still further benefits incidental to the main idea.

*Fine dry coal tends to pack if fired dry. This prevents the proper amount of air from getting to the fuel bed and results in carbon monoxide and a cold fire. Sometimes very dry coal burns out unevenly and will not stay on the grates without allowing holes to form. Large sizes of coal need not be wetted.

Present Practice in Vapor Heating

Previous articles in this series are:

1. *Webster Type R Modulation System, August*, 1926.
2. *Dunham Home Heating System, August*, 1926.
3. *The Illinois System, September*, 1926.
4. *Hoffman Controlled Heat, September*, 1926.
6. *The Trane System, November*, 1926.

7. The Sarco System

THE astounding difference between heating design of Yesterday and To-day is directly a result of a large amount of technical data assembled by the heating engineers during the past 15 years. The proper design of a modern heating system is a technical engineering problem and an engineer should be retained to design a heating system which will give his client a practical, as well as economical, type of system for that particular building.

The heating system as shown in Fig. 1 could be installed in some of the smaller types of buildings. For buildings of a larger type, it would be necessary to use a series of distribution steam and return mains to insure the best possible results.

Perhaps the great advancement in the heating field has been made by the specialty manufacturing companies, which have endeavored to give the engineer, owner and contractor, a type of specialty which is simple in construction and that has insured lengthy service.

One of the latest types of packless radiator valves is shown in Fig. 2. This inlet valve is manufactured by the Sarco Co., New York, and is of the packless type. By the use of helical tubing, it avoids the necessity of packing and as a result, this inlet valve is opened or closed by a three-quarter turn of the handle.

The helical tubing which takes the place of the packing is not annularly corrugated, but made in the form of a helix or spiral to insure long life and reliability. The body is made of heavy brass, and nickeled. The handle is made with a view of obtaining the maximum strength. This is achieved by making in one piece, the handle proper and the stem connecting with the lift screw. The valve stem can be equipped with or without a conical nut thereby making same modulating or full open. This valve can be equipped with either a lever handle or a moulded wheel.

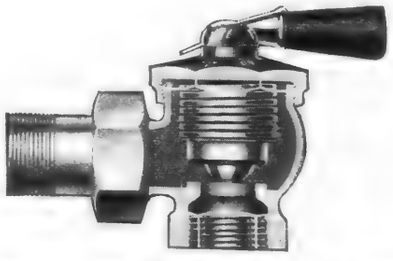


Fig. 2. Sarco Packless Radiator Valve

Pipe Size Inches Dia.	Center Inlet to Outlet in Inches	Capacities Sq. Ft. of Direct Rad'n
½	3¼	up to 40
¾	3¼	41 to 75
1	3⅞	76 to 125
1¼	4	126 to 200

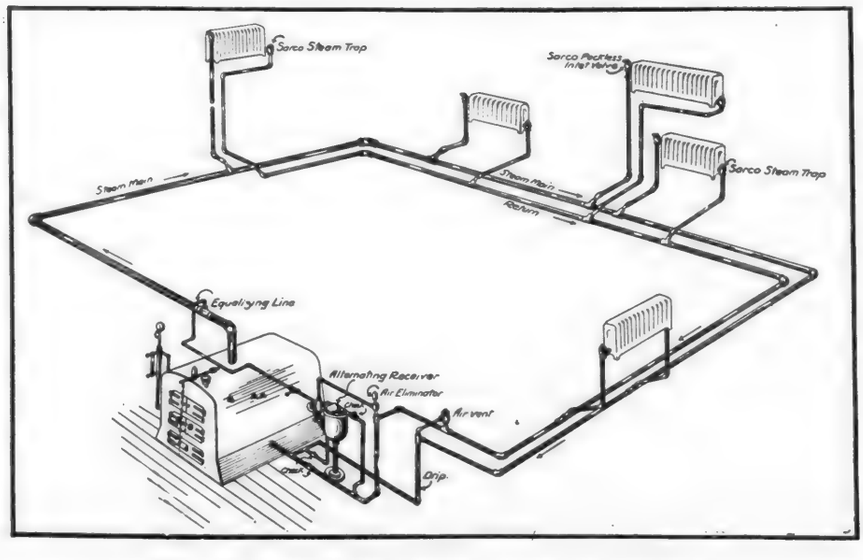


Fig. 1. Sarco Heating-System for Smaller Buildings

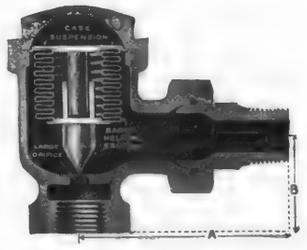


Fig. 3. Sarco Type E Radiator Trap

Size In. – Dia	Dimensions in Inches		Capacity in Sq. Ft. of Direct Rad'n	
			Vapor System	Vacuum System
½	A 3½	B 1½	200	250
¾	A 3½	B 1½	600	650
1	A 3⅝	B 2	1,500	1,800

The radiator trap, Fig. 3, used with this system, is known as the Type "E". The thermostatic expansion or motor element uses a helical bellows made from a seamless bronze tube. The movement in expansion and contraction of the helix is distributed over all the corrugations. This even distribution of the movement is designed to insure a greatly increased life to the motor element. The motor element has a frictionless enclosed centre guide to secure an accurate and positive seating.

Thermostatic or motor elements are suspended in the case and clamped by the cap. This is a patented improvement. They can be interchanged without affecting the adjustment. In new installations, the elements can be removed and the system operated on gravity return until all scale and dirt are washed out. They may then be dropped into place. All elements and trap bodies are interchangeable and replacements can at any time be made by unskilled labor, reducing to this extent the items of source and cost.

The body and cap are made of cast bronze and the union and tail piece of brass. Thermostatic elements, while constructionally rugged, are sensitive to slight temperature changes. They are factory adjusted, giving a ¼-in. vertical movement to give rapid circulation and extremely large capacity, as well as to permit any desired vacuum without the use of injection water.

Fig. 4 shows a somewhat typical layout of connections to the vent valve and alternating receiver. The alternating receiver is the means of returning the condensation to the boiler when the steam pressures rise in excess of the static head. The alternating receiver shown in this sketch has the mechanical equipment assembled on the outside where it is accessible. As the condensation enters the receiver the ball float

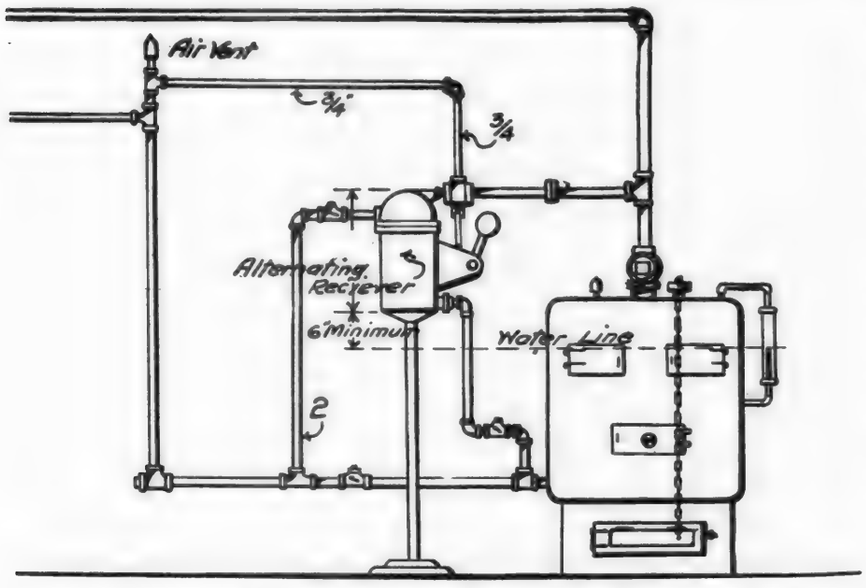


Fig. 4. Typical Piping Around Vent Valve and Alternating Receiver

rises, tripping the counter-weight which operates a three-way valve, allowing the steam to equalize the pressure in the trap and force the water into the boiler. After this operation the float and counter-weight are in their original position and the trap is vented. The check valves are arranged to keep the water from flowing from the boiler into the trap and from the trap into the dry return. The vent valve in this sketch is a free ball-float type, with a double soft-seated featherweight check, which allows the air to be expelled immediately and maintains a vacuum for a considerable length of time, depending entirely upon how tight the remainder of the system is.

The piping arrangement as shown in Fig. 5, would be somewhat typical of a vacuum system. It embodies piping connections to radiators, drip arrangements and pump connections.

Where traps are used to drip steam risers and mains, it is quite essential to have a cooling leg before the trap. This may be done with a horizontal line or through a loop seal, the latter being the more preferable. Where structural conditions will permit, the drips from the steam risers and mains are generally collected and returned to the boiler through a common return line. Under some conditions, it is necessary to connect this drip line into the main dry return. In this case, a trap of large capacity, such as shown in Fig. 6 should be installed.

This trap is known as the Sarco No. 9-3 heavy-duty trap. It is thermostatic and is based on the same principle as the Sarco radiator trap. It is constructed with a cast-iron base, removable cast-iron or brass head and an

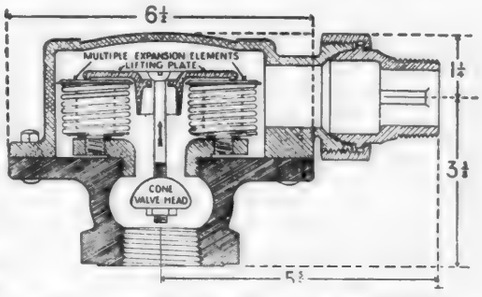


Fig. 6. Sarco No. 9-3 Heavy Duty Trap

Capacity	
Pounds per Hour	Direct Rad'n Sq. Ft.
1,000	3,000
1,000	3,000
1,500	4,500
2,000	6,000

operating element built up of individual thermostatic motor elements, similar to those used in the Sarco radiator trap. The valve stem is hung from the center of a plate which rides on this group of elements. The valve head itself is screwed to the valve stem and a lock-nut is used to fix the adjustment which is made at the factory. As the elements expand, due to temperature, the movement is upward. This draws the valve up so that the valve head closes against the seat. The elements are screwed into a bronze ring which, in turn, is screwed into the body of the trap. The construction permits the complete unit to be removed from the trap body by disconnecting the lower connection or discharge part of the trap, which is attached by bolts. The pressure of the steam operates in opposite directions against the expanding bellows and against the valve head as it rises to its seat.

This trap, being fully thermostatic, will discharge air as well as condensation and can be used to advantage on hot water tanks, Vento stacks, and on other equipment where it is necessary to handle large quantities of air and water.

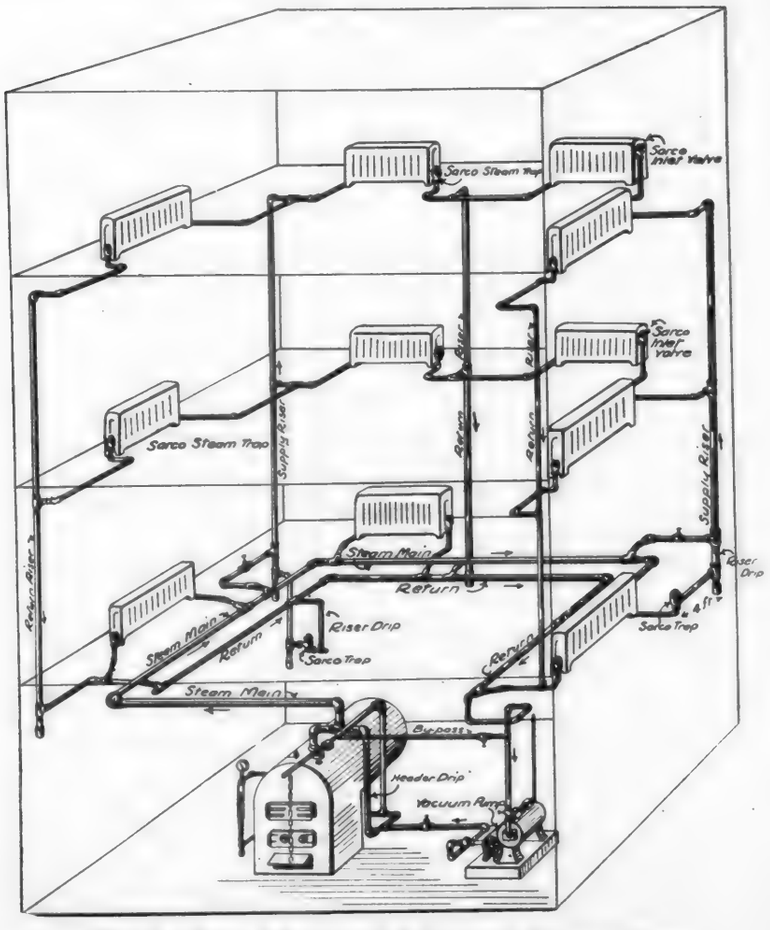


Fig. 5. Typical Sarco Installation with Vacuum Pump

Department Store Uses 800 Tons of Air Every Hour for Ventilation

Ideal weather conditions in the modern department store is one of the biggest factors in their success, according to Howard E. Lovett of Toledo, O., engineering head of the La Salle and Koch Company of the R. H. Macy chain stores. The electrical control of the air in the store for the benefit of the employees and customers, he states, has done away with the old offensive store odors, where the delicate nose could distinguish between the silk department and the calico. The modern store is hooked up with steam heat, air-washing apparatus, refrigerating plants and controlled air for the production of an artificial climate condition which is both inviting and healthful to the public.

Twenty-four million cubic feet, or 800 tons of conditional air are supplied every hour to this Toledo store. Six million cubic feet per hour are used on the first floor alone. Old air is drawn from every room and floor and fresh air, taken from the roof of the building and washed, heated and humidified, is blown in from other ducts or registers.

Eight sets of air-cleaning apparatus, consisting of air washers and air filters are used to cleanse the air of dirt and dust particles. The air filters consist of steel shavings saturated with oil to remove any dirt that escaped the water. The air is heated by the water through which it is blown.

In the candy-making department, the air must be maintained at a temperature of 68° F. and humidity at not more than 40%. In huge vaults storing furs valued at millions of dollars the temperature is held at 28°, or 4° below freezing. This keeps the furs in their natural state as they would be on the backs of the animals they came from, he added.

Mr. Lovett predicted that within a few years every modern department store in the United States would have similar equipment, while every public school, industrial plant and public building should condition the air for health protection.

A Uniform Mechanics' Lien

Every contractor is interested in his status, under the law, in the matter of the mechanics' lien. Uniform State legislation on this subject is a most important and far-reaching action, as far as the contracting business is concerned. Secretary of Commerce Herbert Hoover has appointed a committee of thirteen men to draw up a mechanics' lien act to serve as a basis on which the various States could act, so as to secure uniformity in the law.

The first tentative draft of such an act has already been drawn up and mailed to several hundred trade and labor organizations, as well as to individuals who have expressed interest in this matter.

Death of James B. Stanwood

The death of James B. Stanwood in Cincinnati, O., October 22, will come as a shock to his many friends and business acquaintances. Mr. Stanwood was vice-president and consulting engineer for the Stanwood Corporation, one of the largest companies manufacturing boilers and engines in the Middle West.

He was born at Arlington, Mass., in 1855 and was graduated from the Massachusetts Institute of Technology in 1875. He was connected with Lane and Bodley, Cincinnati, Ohio, as mechanical engineer and later with the Arctic Ice Machine Company, where he remained until 1888.

Mr. Stanwood then returned to Cincinnati and was one of the organizers of the Houston, Stanwood & Gamble

James B. Stanwood

Company, holding the office of vice-president and consulting engineer until 1924. At that time the Stanwood Corporation, the successor of the Houston, Stanwood & Gamble Company, was formed with Mr. Stanwood occupying the same positions in the new organization.

Mr. Stanwood was also an inventor and patented many inventions and improvements for steam engines and boilers. He was a member of the A.S.M.E. for 37 years, as well as the A.S.H. & V.E. and Engineers Club of Cincinnati. His greatest work is embodied in the new design of boilers which he patented and which is known as the Stanwood smokeless boiler. Among his many other activities, Mr. Stanwood was a director of the Technical School of Cincinnati until its absorption by the University of Cincinnati in 1900.

Frederick W. Smith

The passing of Frederick W. Smith, general manager of advertising for the *Plumbers Trade Journal*, removes a figure well known in both the heating and plumbing industries, for Mr. Smith's career had extended over a period dating back to the early days of both industries. He died November 10 in New York, at the age of 57 years.

Mr. Smith was born in Buffalo. During an important period in his career, he was indentified with the American Radiator Company as district sales manager of the Eastern area, with headquarters in New York.

He had previously been general manager of the Standard Radiator Manufacturing Company of Buffalo, which was absorbed by the American Radiator Company in 1901. For a period of seven years, from 1902 to 1909, he was vice-president and general manager of the United States Radiator Company of Dunkirk, N. Y. He then returned to the American Radiator Company and upon his resignation in 1912, he became general manager of the Shirley Radiator Company, Shirley, Ind. From 1907 to 1920, he held the position of sales manager of the Richmond Radiator Company, New York.

He became associated with the *Plumbers Trade Journal* in 1920 in the advertising department and rapidly advanced to the position of director of this department. He leaves an impress on the development of trade journal advertising, as important in its way as that which characterized his activities in the house-heating boiler industry.

Mr. Smith is survived by his widow, two sons, Archie T. Smith of Philadelphia and Robert L. Smith of Davenport, Ia., and a daughter, Mrs. Reid C. Ainsworth of Hazelhurst, Miss.

L. C. Huesmann, president of the Central Supply Co., Indianapolis, Ind., and treasurer of the National Trade Extension Bureau ever since it was organized, died suddenly September 13. Mr. Huesmann was born in Dayton, O., in 1856 and became identified with the Central Supply Company in 1902. He was prominent in many civic movements and was affiliated with many of the large Indianapolis institutions.

Benjamin Noble, president of the Capitol Brass Works, Detroit, Mich., died recently after a long and active career, dating from 1885. The Capitol Brass Works was established by Mr. Noble in 1898 and, in 1908, he built the first portion of the present plant. In 1914, the plant was increased to double its capacity. Mr. Noble was also vice-president of the Continental Real Estate Company, a director in the Title and Trust Company, a member of Detroit Golf Club, the Lochmoor Golf Club, Detroit Curling Club and Detroit Athletic Club. He is survived by his wife, two daughters and a son, G. H. Noble, vice- president of the Capitol Brass Works.

Fred J. Trautman, vice-president of the Samuel A. Esswein Heating and Plumbing Company, Columbus, O., died at his home in that city after an illness of two weeks. Mr. Trautman was in his sixty-second year and had been connected with his company for thirty years.

Chart for Figuring Celotex When Used for Roof Insulation

To meet the rising demand for insulation for residences and roofs, the use of Celotex industrial board is being advocated by the manufacturer, the Celotex Co., 645 North Michigan Blvd., Chicago.

The material is manufactured in strong boards from tough fibres of cane. It is furnished in one size only, 3 ft. by 6 ft. and is approximately ½ in. thick. Celotex has a conductivity of 0.33 B.T.U. per hour, per square foot per degree F., per inch of thickness.

It is claimed that this product compresses less than 1¼% under a load of 720 lbs. to the square foot, and that this resistance to compression practically prevents puncture of the roofing by the workers.

Celotex is described as light, but rigid, easily handled and quickly applied, having the advantage of allowing any standard type of roofing to be laid over it. The fibrous texture of Celotex lends itself to mopping, so that adhesion is secured to the roof deck and between layers. About 30 lbs. of pitch or asphalt are required for mopping each 100 sq. ft. The boards are made of a suitable size to be imbedded with an average mopping.

The tensile strength of the material is 373 lbs. per square inch. When laid in one layer, there are few joints and when used in multiple layers, open joints are eliminated by laying each course so that the joints are offset with respect to those of the preceding course.

Celotex industrial board is designed primarily for roof insulation, but it may be used under plaster as sheathing, or insulating in the structural requirements of residences.

For the information of those desiring to use this material, the manufacturers have prepared the condensation chart shown in Fig. 1, this chart being for the purpose of determining the number of thicknesses of Celotex necessary to prevent condensation under a given set of conditions.

HOW TO USE CHART

To use this chart, it is necessary to know the inside temperature, relative humidity, lowest outside temperature and the construction of the roof. Directions for using this condensation chart are as follows:

1. Locate the inside temperature on scale "A" and pass horizontally to the proper relative humidity *curve* indicated on scale "B".

2. From this point pass vertically downward to the horizontal "heat head" line indicated by scale "C." (The "heat head" is the difference between the inside temperature and the lowest outside temperature).

3. Draw a line from the point last determined to the lower left-hand corner of the chart or "0°" on scale "C."

4. Where this line intersects with scale "D" draw a horizontal line to the right and the roof resistance required to prevent condensation will be indicated by scale "E."

5. To determine the number of layers of Celotex required, ascertain the resistance of the roof from the table of resistances.

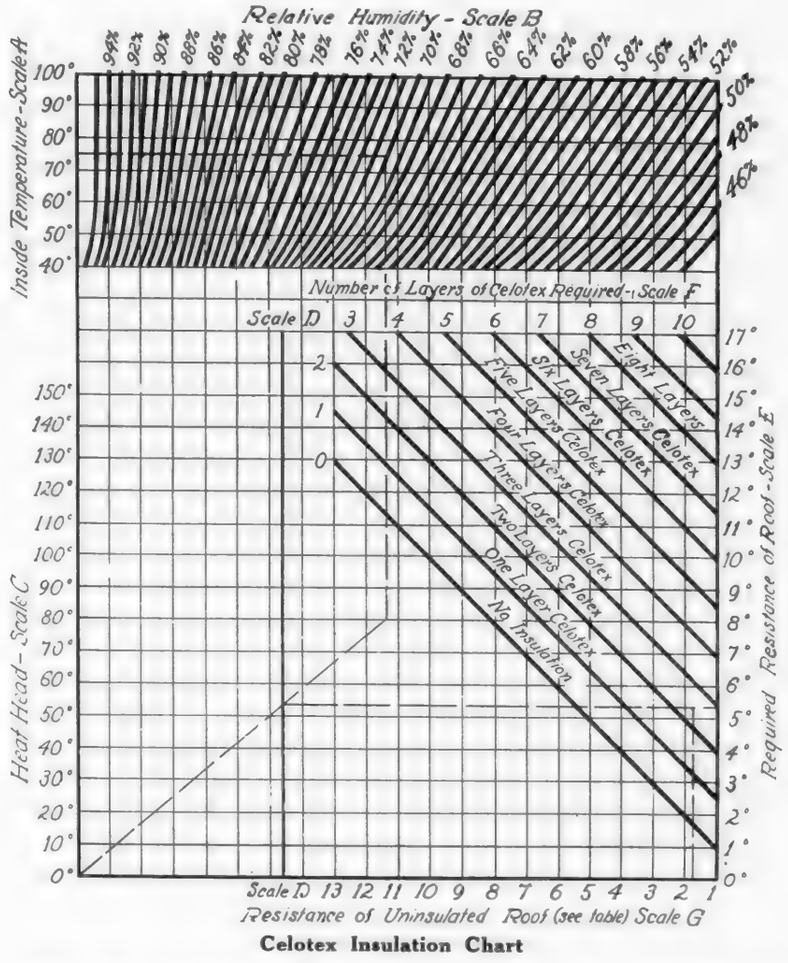
of layers of Celotex required to prevent condensation for the following conditions:

Inside temperature	75° F.
Relative humidity	70%
Lowest outside temperature	— 5° F.

Construction of roof; 4-in. reinforced concrete and built-up roofing.

The solution of this problem is indicated on the chart by the dash line.

1. At the temperature of 75° F. on scale "A" pass horizontally to the right to the 70% relative humidity curve indicated on scale "B."


Relative Humidity - Scale B
94% 92% 90% 88% 86% 84% 82% 80% 78% 76% 74% 72% 70% 68% 66% 64% 62% 60% 58% 56% 54% 52% 50% 48% 46%
Inside Temperature - Scale A
100° 90° 80° 70° 60° 50° 40°
Number of Layers of Celotex Required - Scale F
Scale D 3 4 5 6 7 8 9 10
2 1 0
One Layer Celotex
Two Layers Celotex
Three Layers Celotex
Four Layers Celotex
Five Layers Celotex
Six Layers Celotex
Seven Layers Celotex
Eight Layers
No Insulation
Heat Head - Scale C
150° 140° 130° 120° 110° 100° 90° 80° 70° 60° 50° 40° 30° 20° 10° 0°
Required Resistance of Roof - Scale E
17° 16° 15° 14° 13° 12° 11° 10° 9° 8° 7° 6° 5° 4° 3° 2° 1° 0°
Scale D 13 12 11 10 9 8 7 6 5 4 3 2 1
Resistance of Uninsulated Roof (see table) Scale G

Celotex Insulation Chart

6. Locate the resistance of the roof on scale "G" and pass vertically to the horizontal line drawn to scale "E" indicating the required resistance of the roof.

7. The diagonal line just above the intersection of the two lines located as per the last paragraph, shows the number of layers of Celotex industrial board required to prevent condensation for the conditions under consideration.

EXAMPLE OF USE OF CHART

For example: Determine the number

2. From this point pass vertically downward to the 80° F. heat head line indicated by scale "C." (The heat head of 80° F. is the difference between the inside temperature of 75° F. and the lowest outside temperature of 5° below zero.)

3. Draw a line from the point last determined to the lower left-hand corner of the chart, or "0°" on scale "C."

4. Where this line intersects with scale "D" draw a horizontal line to the right and the roof resistance required to prevent condensation indicated by scale "E" is 5.32.

5. To determine the number of layers of Celotex required to prevent condensation, refer to the table of resistances and ascertain the resistance of a 4-in. concrete roof and it will be found that the resistance of a roof of this construction is 1.80. This figure is to be used in Scale "G."

6. At 1.80 on scale "G" pass vertically to the intersection of 5.32 on scale "E."

7. The diagonal line just above the intersection of these two lines indicates that three layers of Celotex industrial board will be required to prevent condensation for the conditions under consideration.

TABLE OF RESISTANCES

Construction	RESISTANCE Without Suspended Ceiling	With Suspended Ceiling of Metal Lath and Plaster
Flat Metal Roof Deck	1.22	
Precret Cement Tile	1.52	
2-in. Concrete	1.56	3.51
2-in. Concrete, Cinder Fill	2.04	3.98
2-in. Concrete, 2-in. Hollow Tile	2.51	
2-in. Concrete, 4-in. Hollow Tile	3.15	
2-in. Concrete, 6-in. Hollow Tile	3.64	
2-in. Concrete, 8-in. Hollow Tile	4.63	
3-in. Concrete	1.68	3.62
3-in. Concrete, Cinder Fill	2.16	4.10
4-in. Concrete	1.80	3.75
4-in. Concrete, Cinder Fill	2.28	4.22
4-in. Concrete 2-in. Hollow Tile	2.76	
4-in. Concrete 4-in. Hollow Tile	3.39	
4-in. Concrete 6-in. Hollow Tile	3.88	
4-in. Concrete 8-in. Hollow Tile	4.85	
5-in. Concrete	1.92	3.86
5-in. Concrete, Cinder Fill	2.40	4.35
6-in. Concrete	2.04	3.98
6-in. Concrete, Cinder Fill	2.52	4.46
7-in. Concrete	2.16	4.10
7-in. Concrete, Cinder Fill	2.64	4.59
8-in. Concrete	2.28	4.22
8-in. Concrete, Cinder Fill	2.76	4.72
		With Suspended Ceiling of Wood Lath and Plaster
1-in. Planks (⅞-in. thick)	2.14	4.31
1½-in. Planks (1¼-in. thick)	2.51	4.67
2-in. Planks (1¾-in. thick)	3.01	5.18
2½-in. Planks (2¼-in. thick)	3.51	5.68
3-in. Planks (2¾-in. thick)	4.02	6.17
3½-in. Planks (3¼-in. thick)	4.51	
4-in. Planks (3¾-in. thick)	5.00	
		With Celotex and Plaster
1-in. Planks (⅞-in. thick)	2.14	5.59
1½-in. Planks (1¼-in. thick)	2.51	5.95
2-in. Planks (1⅜-in. thick)	3.01	6.45
2½-in. Planks (2¼-in. thick)	3.51	6.94
3-in. Planks (2¾-in. thick)	4.02	7.46
		With Celotex Interior Finish
1-in. Planks (⅞-in. thick)	2.14	5.26
1½-in. Planks (1¼-in. thick)	2.51	5.65
2-in. Planks (1¾-in. thick)	3.01	6.14
2½-in. Planks (2¼-in. thick)	3.51	6.62
3-in. Planks (2¾-in. thick)	4.02	7.14

Court of Homes, Built of Tested Material, at Own-Your-Home Exposition

Testing of materials before permitting their exhibition is the idea advanced and being put into practice for the 1927 Own-Your-Home Exposition, which is held annually in both Chicago and New York. The ninth annual New York exposition will take place in Madison Square Garden, February 19-26, 1927, and the Chicago seventh annual exposition will be held at the Coliseum, April 2-9, 1927.

Robert H. Sexton, managing director, says:

"The exposition management believes that it should not assume a competency it does not have in judging material values. As a result of this decision, there will be accepted for exhibit only building materials that are included in the official classification covering the character of building materials eligible for exhibit and then only after each individual concern has been approved and recommended by the exhibit committee under whose classification it belongs. Following this we now require a test of material quality by the Architectural Committee on Management, whose final approval is necessary before the product is accepted for exhibit."

Another idea being worked out is the "Court of Homes" in which an artistic grouping of a number of full-sized residences, built of the various accepted and proper materials, will be shown. Plans for these homes are being arranged in such a way as to interest not only architects and builders, but prospective purchasers of homes as well.

Argentina Going in for Heat

Buenos Aires, Argentina, reports that the increasingly severe winters in that country are bringing into popular favor the steam-heated apartment houses. Many of the detached houses, which are totally without heating facilities, are being deserted for the more comfortable heated apartments by tenants who, a few years ago, had never heard of modern heating systems. The local press has also started a campaign advocating winter heating in railroad stations, street cars, subways and schools, pointing out that every year it is becoming colder, to the great inconvenience and discomfort of the traveling public and school children.

Theater of Latest Type Employs Oil Burners

The new Rialto Theater, rapidly nearing completion in South St. Joseph (Mo.) will employ oil burners with automatic regulators to keep the temperature at 70° F. and will be equipped with a ventilating system capable of changing the air every two minutes. This theater is being erected by the Sun Amusement Company and is patterned after the Capitol Theater in New York and the Uptown Theater in Chicago. The theater will seat 1250 persons, is of fireproof construction and embodies all the latest features in theater construction, being arranged so that it can be emptied within two minutes.

ILLINOIS HEATING SYSTEMS—VAPOR DETAILS, is the title of a new catalog issued by the Illinois Engineering Co., Chicago, Ill. This booklet covers the installation of the Illinois thermo-modulating system of vapor heating for apartments, hospitals, hotels, schools and residences and is known as Bulletin No. 22. It contains a general description of the Illinois vapor system of heating and later defines in detail what this manufacturer considers as true vapor heat. It includes a 24-hr. recording pressure chart which shows such a system operating during nearly 20 hours out of a possible 24 at true vapor conditions and below atmospheric pressure, sometimes going up to 16 in. vacuum, particularly around 11:00 A. M. and 1:00 P. M. It is also stated that the boiler only received attention four times in the 24 hours which the chart covered.

Illinois heat retainors and other specialties are featured and typical vapor systems and boiler room arrangements are shown, together with basic rules for computing radiation and boiler sizes as compiled by the Chicago Master Steam Fitters Association. On the whole, a valuable and useful publication, especially for those interested in vapor heating. Size 8½ x 11 in. Pp. 24.

New Apparatus and Appliances

Dunham Announces Differential Vacum Steam System

A vacuum system operating on a practically constant and fixed differential, the result of years of research work, backed by analytical operative tests, is announced by the C. A. Dunham Co., Chicago, Ill., in connection with its new Dunham differential vacuum heating system.

The manufacturers state that this system is already in operation in several commercial installations and that it has thoroughly proved its practicability and economy.

By means of a differential controller on the vacuum pump, it is possible to maintain a lesser pressure in the return lines than in the steam lines, regardless of what the steam pressure may be, within any reasonable limit.

In mild weather, steam pressure can be maintained on the negative side of the gauge with a corresponding increase in vacuum on the return, while in severe weather, steam can be supplied at whatever pressure may be desired with the return line pressure differential kept the same.

Advantages claimed for this type of system are a fixed differential, permitting the steam to circulate at all reasonable pressures and temperatures; more uniform circulation, because the pressure in the steam main is always slightly higher than that in the return; high fuel economy; a system that will operate with coal, oil or gas as a fuel; and the quicker generation of steam when starting in with a cold boiler, due to the formation of steam (under the partial vacuum maintained by a vacuum pump) beginning at a much lower temperature than when under atmospheric pressure.

The return ends of the radiators are equipped with Dunham thermostatic traps which function so as to pass the air and water into the return line, but to retain the steam in the radiators under the varying conditions of operation which occur.

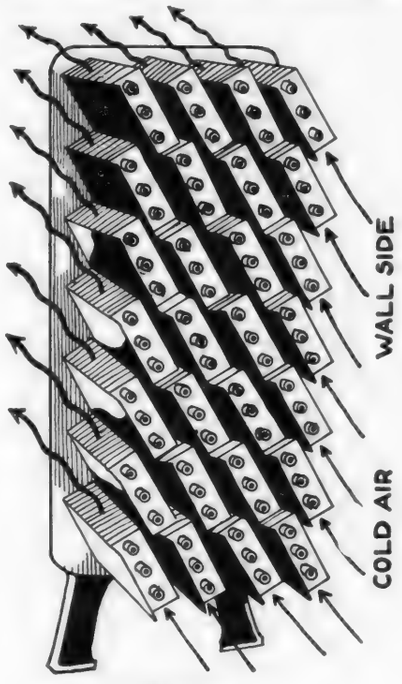
The Sage Cabinet Radiator

Announcement is made that the Sage cabinet radiator is now being manufactured by the Bridgeport Rolling Mills, Inc., Bridgeport, Conn. This unit was originally brought out by the Sage Radiator Company, Inc., of Syracuse, N. Y., and was illustrated and described in THE HEATING AND VENTILATING MAGAZINE for April, 1924.

The new model is constructed entirely of copper and brass and, of course, is highly resistant to corrosion. It is of the unit type and is formed from a large number of small steam-carrying tubes with extended fin heating surface. Seamless copper is used in the construction of the tubes, which are 5/16 in. outside diameter and run horizontally in the radiator. The fins are high brass, 0.009 in. thick, 2¼ in. long and ⅞ in. wide. The fin has a 5/16 in. flange at right angles to its main surface. The heating elements are composed of three tubes, spaced ¾ in. apart, and of an assembly of fins spaced three fins to 1 in. of tube length. The length of each element is determined by the length of the radiator. Tube and fin assembly are made metallically integral by means of a mechanically-effected tin bath covering the tubes only and producing a rigid union.

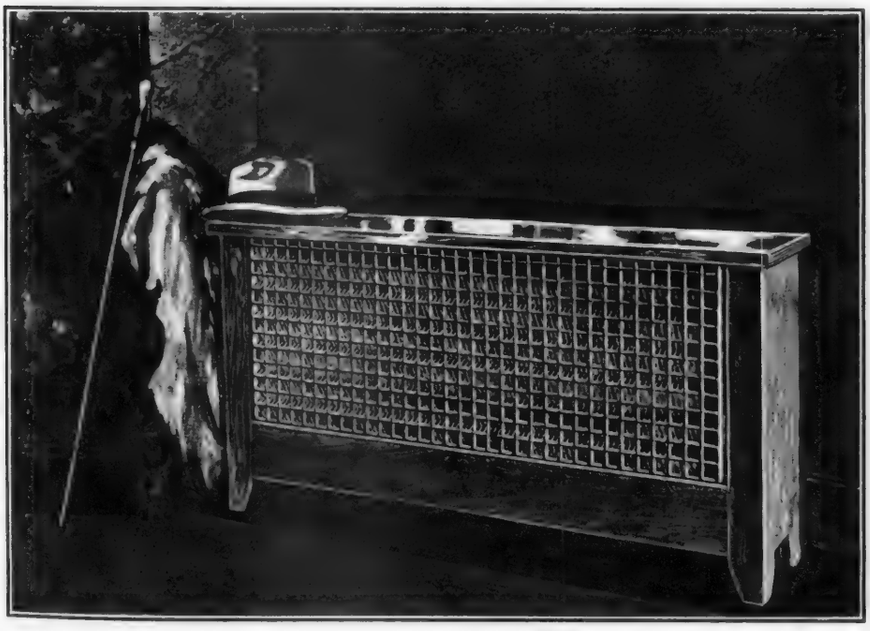
The tube plates are flat, of high brass with pierced holes, which are somewhat smaller than the tube diameter and are slightly countersunk. These holes are pierced in series and all arranged in staggered formation.

The tube ends of each element are driven through the tube plate approximately ⅛ in. and expanded. Then to form a permanent, metallically-integral union, the tubes are brazed to the tube plates. As shown in the illustration, each element is set into the radiator so as to face the room, at an angle of 60° from the horizontal. The solid back of each element is set towards the wall, with the exception of the last stack on the room side which faces the room. The resulting construction is a fin arrangement forming channels for free air passage through the radiator.

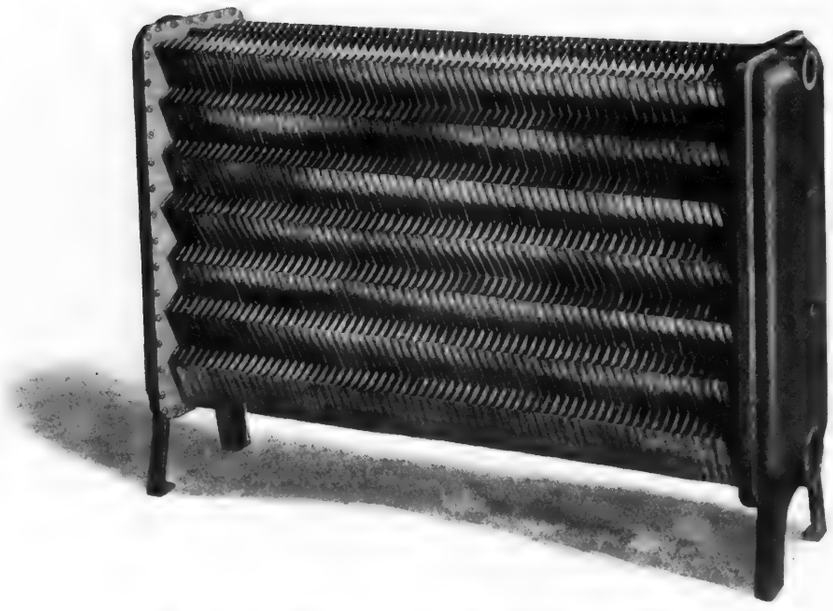


Detail of Interior Construction of Sage Cabinet Radiator

At this stage of the construction, the radiator is tested under water by compressed air at high pressure. This test is severe and its purpose is to disclose any possible defects before the final assembly. Complete assembly of the radiator is made by a ground union with the headers, secured by 55 screws and the whole made metallically integral and in union by brazing. The headers are of cast bronze, ⅛ in. minimum wall thickness, with no baffles. Upper and lower supply and return tappings of standard radiator size are provided on both ends and air valve tappings are also inserted. The radiator is then given a last and final testing, first by steam to thoroughly heat the radiator, followed by a second compressed-air-pressure test under water.



Complete Assembly of Sage Cabinet Radiator

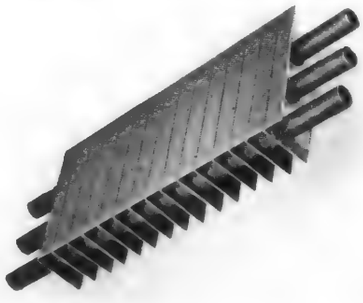


Sage Cabinet Radiator Ready for Placing in Cabinet

Cabinets supplied with these radiators are 20 in. in height, with hinged tops, which may be opened at 30 degrees during extremely cold weather to increase the efficiency. They are finished in wood grain, or in special finishes to harmonize with decorative schemes; the lacquer finishes are durable and highly polished, to prevent damage by heat or water. The grille is press formed and has a 72% free air opening; it is removable, but close fitted to prevent rattling.

AIR DELIVERED AT ANGLE OF 60 DEGREES

One of the chief advantages claimed for this radiator is that it discharges the air in the room at an angle of 60 degrees, thus throwing it more towards the floor and less towards the ceiling than the ordinary radiator.



Segment of Sage Cabinet Radiator Showing Tubes and Fins

The radiator weighs about 1 lb. per square foot, as against about 7 lbs. per square foot of ordinary cast-iron radiation. It is claimed by the manufacturers that nine-tenths of the heat, which is usually held in storage by the cast-iron radiators, is given off immediately by the Sage radiators, and that the relative time required to heat the radiators is 1 to 9.

These radiators, being of brass and copper, require no painting and are delivered ready to install, requiring no later re-conditioning. The grooves of the radiator, being perfectly straight and flat, offer no rough surfaces for the collection of dirt, and can be cleaned by any ordinary vacuum tool, upon removing the grille.

American Blower Company Announces Dry Plate Air Filter

A dry air filter has been placed upon the market by the American Blower Company, incorporating a number of interesting features of design and construction. The complete filter consists of a skeleton framework, in which cells, 16 x 18 in. are mounted. Each cell is composed of ten or more perforated aluminum plates arranged in series. Each plate is pierced with the required number of apertures. A fire-proof hair-like material is then placed upon the plate and a ferrule turned back from each mold, thus firmly gripping the layer of material completely around each orifice and further providing a smooth-finished surface around the edge.

The outer edges of the plate are then flanged, strengthening the plates and providing a definite spacer. The plates are placed in a reinforced aluminum frame and held in position by eight small bolts.

The entering dust-laden air is divided into a series of small jets by the perforations in the first plate. These small jets of air strike the flat filament-coated surface of the second plate; particles of dust and dirt are projected against the filament and retained by it, while

American Blower Company's Dry Plate Filter Assembled

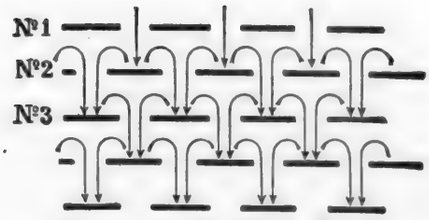
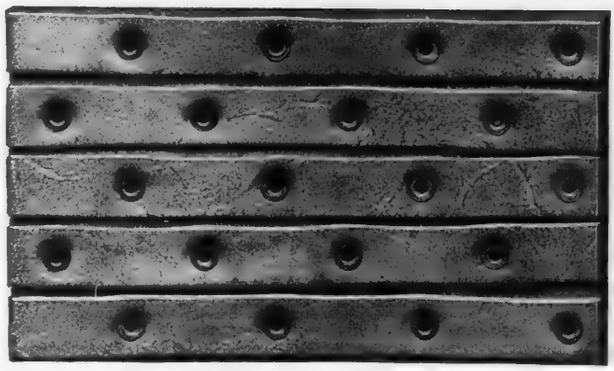


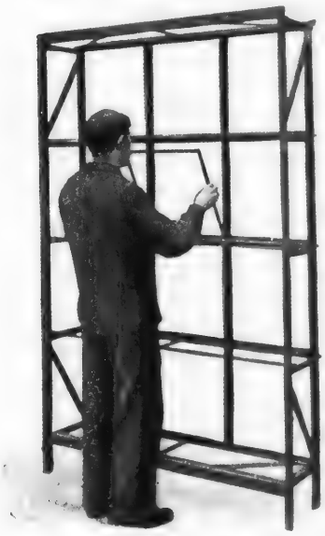
Diagram of Air Flow, Showing Free Air Spaces

the air, changing its direction and rebounding from the surface, flows parallel to the plate surface to the staggered orifice of the second plate, passing on through ten successive dust removal operations identical to the above.

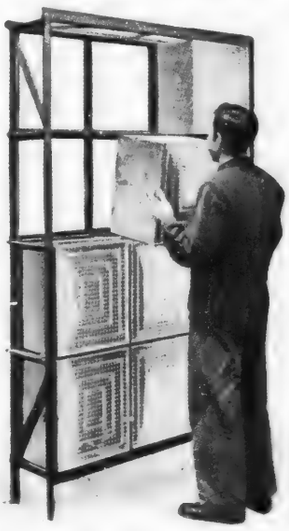
As dust builds up on these flat surfaces, each preceding layer acts as a retentive member, the dust itself being the principal retaining factor for the ensuing particles. As there is no reduction of orifice area, the cleaning effect is practically constant.



Right—Tentacular Belt, Showing Hollow Rivets



Left—Frame Work of American Blower Company's Dry Plate Filter, Ready to Receive Cells.



Right—Assembling the cells in the American Blower Company's Dry Plate Filter.

The air is purified from plate to plate in a constantly-decreasing rate of removal, the quantity collected by the last ten plates being approximately 1/100 of that collected by the first plate.

The unloading of the filter is simple. The cell is removed from the frame and in small installations, the dust is removed by merely rapping the cells with the hand. For large installations, a special mechanical rapper is provided which, it is stated, will thoroughly unload a unit in one minute.

On a laboratory set-up, approaching as nearly as possible maximum industrial conditions, it is stated that this filter will remove 93% of the solids continuously, until fully loaded, with an unchanged volume of air flow.

This dry plate filter is also inherently adapted to the recovery of valuable dusts and particles, which can be readily removed from the filter in a dry condition. The friction of a standard cell is given as 0.375 in. of water.

Tentacular Transmission Belt for Fans and Blowers

Tentacular belting, placed on the American market about two years ago, by Alexander Bros., Philadelphia, has met with considerable favor among ventilating engineers. The manufacturers state that this belt can be used and may be seen in operation in a number of places where the requirements are unusually severe. The belt itself was originally designed for ventilating fan use and although it has since been applied to many other purposes, it is still primarily a fan-drive belt.

The tentacular belt may be described as a leather or balata backing, on the pulley surface of which are attached narrow longitudinal strips of a highly-adhesive material. This adhesion is increased by the suction of special hollow rivets, which, at the same time, hold the strips to the backing. The narrow space between each pair of strips provides an air channel, ventilating the belt and relieving air pockets between belt and pulley. This belt is said to combine a high co-efficient of friction, a high tensile strength and little stretch. It does not require special equipment or pulleys, the only change being the elimination of the idler-pulley whenever used with ordinary belting.

This belt will operate on very short pulley centers and even when the pulley ratio is unusually high. For this reason, a considerable saving in space can ordinarily be effected. Idler pulleys are unnecessary and the life of the belt is claimed to be longer than the ordinary double-thick leather belt.

One of the chief advantages of this belt is stated by the manufacturers to be the reduction in the amount of slip to about 1%. They also state that there is practically no limit to speed at which this belt can be run and its efficiency remains almost constant, whether operating at 1000 F.P.M. or 7000 F.P.M. The quietness of operation is also a most important feature in connection with ventilating work.

Quaker Heat Cabinet for Oil and Coal

An innovation in the heating equipment is the heat cabinet recently developed by the Quaker Mfg. Co., Chicago, for use as a unit warm air heater in small homes. It consists essentially of a development of the Quaker stove, which has been on the market for a number of years, in which is incorporated for use with oil fuel, a Breese atmospheric burner. The stove unit is enclosed in a rectangular casing of sheet steel finished in baked vitreous enamel and an interesting feature is the duplex oil tank, which is an integral part of the unit. An effective humidifier is provided in the form of a drawer at the top of the unit.

The two doors comprising the front of the cabinet open after the fashion of safe doors and disclose a metal shield

Quaker Heat Cabinet Utilizing Oil or Coal

Quaker Heat Cabinet with Doors Opened

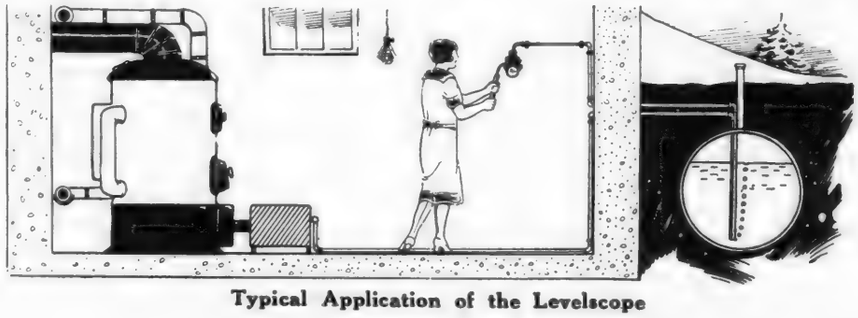
covering the entire front of the stove. In the shield is a mica-covered peek hole for inspection of the burner.

The burner is an extremely simple device, developed by Mr. J. L. Breese, consisting essentially of a metal pot, on the floor of which the oil is distilled into oil gas. Air is admitted through a series of properly-assigned holes in the sides of the bowl and the result is a flame of Bunsen characteristics.

A similar unit is manufactured with conventional grate and fire door for use with coal fuel. It is interesting to note that because of the simple character of the burner, the cost of the oil burning unit, complete, is very little more than that of the coal-fired heater. The burner is designed to operate on 28-36° oil.

Levelscope—New Tank Capacity Indicator

This is an indicator based upon one of the oldest physical laws and designed for use primarily in connection with oil-burning installations where the tank is buried outside of the building. The instrument is in reality an air-pressure recorder, the indication being obtained by pumping air into the Levelscope. A single tube from the instrument extends to the bottom of the tank. When sufficient air has been pumped into the instrument through the permanently-connected hand air pump to more than equal the pressure-head caused by the oil, the excess air will bubble up through the oil and when the bubbling ceases, the air pressure in the Levelscope will be identical with the pressure head of the oil in the tank. By taking a few strokes of the pump whenever a reading is desired, all errors are eliminated which would be due to change of temperature of the air in the instrument or a minute leak somewhere in the line. An air-release valve on the side of the Levelscope relieves it of all air pressure and should be pressed before a reading is taken. This automatically throws the indicating pointer to zero and insures a complete new air supply. The dial on the Levelscope is divided into hundredths of the tank's capacity and the dial is plainly marked with the total capacity of the tank. The hand set pointer is a convenient feature, as it may be set at the time a reading is taken and the oil consumption between ratings is thus easily determined.



Typical Application of the Levelscope

Ilg Announces Electric Unit Heater

A unit heater, in which electricity is the heating medium, is announced by the Ilg Electric Ventilating Co., Chicago. This heater will meet a demand for apparatus where it is necessary to heat

Electric Unit Heater Made by Ilg Electric Ventilating Company

at certain times only during the day or to take the chill out of the air. In other places, where the heating season is short, or where the problem of heating is local, that is to say, confined to one or two rooms of a group, it will also find application. The new unit will likewise prove useful where either steam or hot water is not available, or where it would prove inconvenient or expensive to make any additional installation and it will be particularly welcome in localities where the cost of electricity is low.

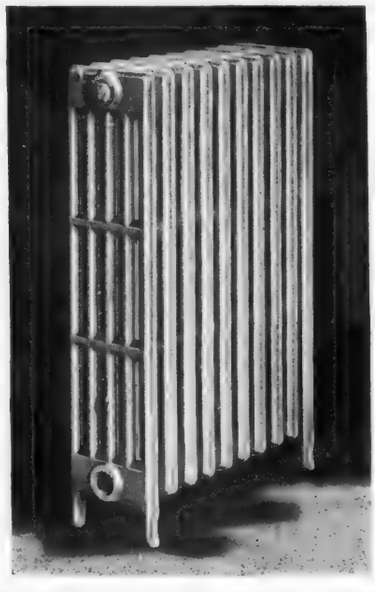
The operation of the new heater is practically the same as the old, the electric heating element replacing the steam or hot water coils. Air is drawn over the heating element at very low velocity and discharged at high velocity, thus insuring minimum power consumption while providing maximum heating capacity. The new type of heater also features the patented adjustable deflector which controls the placement of the heat waves at their source.

This particular type of unit heater has been on the market for over a year, during which time the manufacturers say it has demonstrated its practicability and value, especially in heating spacious rooms quickly, the action of the fan soon distributing the heat waves where they are wanted.

The Eastwood Radiator

A radiator of new design has been placed on the market by the Pierce, Butler & Pierce Mfg. Corp., New York. The appearance of these radiators is artistic and they have been produced in 3-tube, 4-tube, 5-tube and 7-tube widths. They are rated height for height exactly the same as the 1-col., 2-col., 3-col., and 4-col. widths of the more conventional type. The widths of the respective sections also correspond very closely, with the advantage somewhat in favor of the Pierce Eastwood in the 3-tube and 7-tube patterns.

The spacing of the sections is identical in both patterns, 2½-in. centers for the three narrower widths and 3-in. for the widest. For this reason, Eastwood radiators are practically interchangeable with radiators of standard pattern. The



The Pierce, Butler and Pierce Eastwood Radiator

radiator is assembled with right-and-left-threaded heavy malleable cast-iron screw nipples, this construction being

adopted for artistic reasons, and not because of any real or fancied mechanical superiority over the slip or push nipple joint. The screw nipple eliminates the tie rods, extending from end to end of the radiator, which would detract from the light and graceful Eastwood design.

The metal air seal between the cells is flexible and dust-tight and a labyrinth air lock is provided between the cell chain and the filter frame. Operation may be arranged on either on a continuous or intermittent basis. There is no free oil or oil spray used and the air flows in through both the sides and top of the apparatus. The direction of the air flow may be through the duct opening or in a reverse direction. An extra large sediment drawer is also provided.

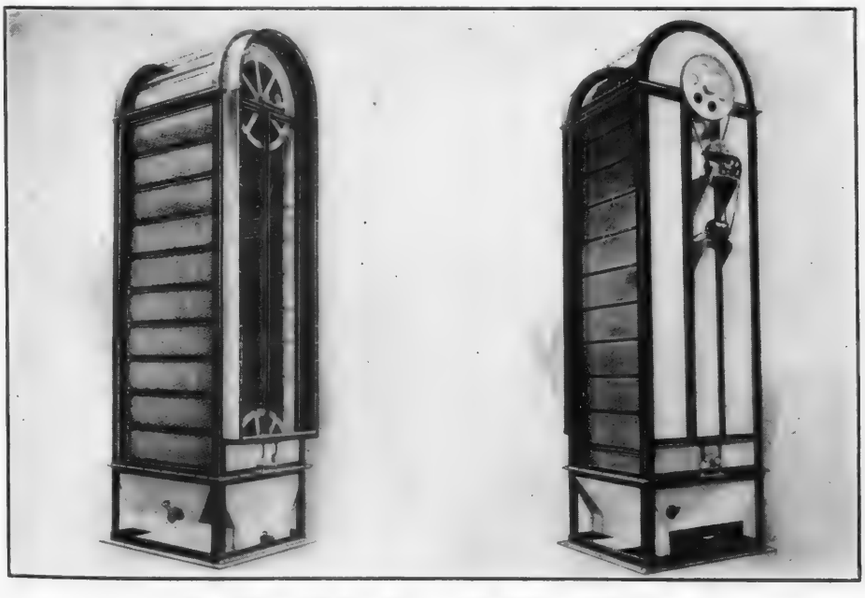
Self-Clean filters are supplied in standard units with capacities of 10,000 cu. ft. per minute up to 250,000 cu. ft. per minute and can be arranged in multiple so as to give any desired capacity above 10,000 cu. ft. per minute, as desired, and to meet any conditions of space and floor load which may be encountered.

Each cell has a capacity of 1000 C.F.M. and the resistance at this capacity is ⅜-in. of water. The electric power required per unit per annum is given as 2 K.W.H. for intermittent operation and 1095 K.W.H. for continuous operation.

Midwest "Self-Clean" Air Filter

A type of rotating air filter has appeared on the market in the shape of the Self-Clean air filter, manufactured by the Midwest Air Filters, Inc., Bradford, Pa. The manufacturers state that in this filter all the advantages of the Midwest unit type of filter have been retained, while the requirements sought in the revolving type have been satisfactorily met.

The outstanding features of this filter are a standard top and base, with the intermediate casing separate and interchangeable. The filter is arranged to be bolted directly to wall or partition, if desired. The air connection is designed to give a uniform air velocity through the filter and the standard Midwest filter medium is used in filter cells which are demountable and interchangeable.



Two Views of the Midwest Self-Clean Air Filter

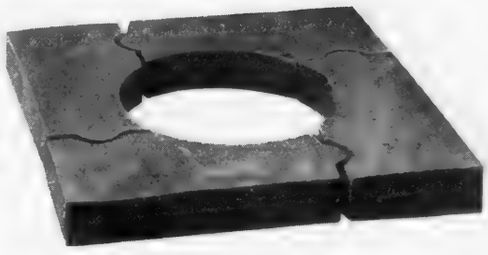
Powers High-Pressure Thermostatic Trap

A product recently placed on the market by the Powers Regulator Co., Chicago, Ill., is a thermostatic trap, made for pressures from 5 to 125 lbs. and in two sizes, ⅜-in. and ½-in. The trap is built on the vapor disc principle and is so small that it can be held in the palm of the hand. The disc action is so definite that the valve is either wide open or tightly closed and, therefore, will not "wire draw." Monel metal is used for both the disc and the valve. Care is taken in the design of the valve seat and the position in which it is placed to prevent any dirt and scale that will pass through the strainer in the inlet from lodging on the valve seat.

Interlocking Brick Chimneys

It is a well-known fact that the majority of fires in the United States are caused by defective flues in chimneys. In an effort to overcome this difficulty, a type of flue brick has been developed by New Round Flue Safety Chimney Co., Holland, Mich. A new company, incorporated under the name of the Holland Chimney Co., with James DePree general manager and treasurer of the company, has been formed to market the new product.

This brick is developed on the principle of a duplicate unit. Four units are used in the course of a chimney. The adjacent courses are arranged in opposite directions, so as to break the vertical joint between each course, both inside and outside. The bricks are of identical design, with interlocking joints, each brick with the next, so that there is no straight joint from the flue to the outside of the chimney.



Typical Course of Interlocking Chimney Brick

It is maintained by the manufacturers that this type of brick, if properly laid, does away with the dead corners occurring in the ordinary square flue-lined chimney, which corners are the source of the collection of soot, later giving rise to chimney fires. Also, that the laying of these bricks in a square form on the outside of the chimney automatically produces a round flue of the required character on the inside and vice versa. Under actual experimental conditions of test in one of the largest furnace experimental plants it was shown that the round flue, unlined, but interlocked, chimney produced upwards of 30% additional draft over the square-lined type of equal flue area. In checking up one or two of the chief furnace companies in the industry, the manufacturers found them unanimous in claiming that 90% of their troubles were traceable to defective and inefficient flues.

Partially Constructed Chimney of Interlocking Brick

It is expected that this flue brick will do away with the dangers of imperfect flue lining and of damaged flue lining caused by cutting openings into the chimney.

New Trade Publications

ECONOMY IN OIL-BURNER INSTALLATION is the title of a large folder being distributed by International Heater Co., Utica, N. Y. This circular is designed to indicate the general satisfaction obtained by the combination of Economy boilers with oil burners and the claims are backed up by reproductions of many letters from oil-burner dealers, testifying to the excellent results obtained with their several burners. The outstanding features of the Economy boiler are large combustion space, long gas travel, combined with large direct heating surface and such ruggedness of construction as will permit the burner to withstand the sudden and intense heat generated by the starting of an oil burner. It is stated that 85% efficiency has been shown with the Economy boiler when burning oil.

REED AIR FILTERS in the new building of Hibbard, Spencer, Bartlett & Co., of Chicago, are the subject of a folder issued by Reed Air Filters Co. Inc., Louisville, Ky. Graham, Anderson, Probst & White are the architects, and Mehring & Hanson, Chicago, the contractors. The folder states that over 200 Reed air filter units have been installed to clean air in this great building and that over 30,000 are now in use in the country, cleaning almost 25,000,000 cu. ft. of air each minute.

MURDOCK PUMPS are brought to the attention of the trade in a price list and information sheets covering combination and vacuum return systems. This apparatus which is manufactured by the Murdock Pump Co., Indianapolis, Ind., includes a receiver tank, vacuum pump and motor, water pump and motor, automatic float control switch and base on which all the apparatus is mounted. The vacuum pump is placed at one end of the base and the hot water return pump is placed at the other, the operation of the vacuum pump being controlled by an automatic switch in connection with the electric motor. When the vacuum reaches 6 in., the switch shuts off the motor and, when it falls to 1 in., the motor is again thrown into operation. The return pump runs in connection with the 40-gal. tank mounted on the base and is controlled automatically by a float switch. Throwing off this switch causes the water to be pumped back into the boiler.

FOXBORO-HEATH Co_2 RECORDER is described in a folder issued by the Foxboro Co., Inc., Foxboro, Mass. The bulletin describes an automatic recording orsat that accurately and continuously analyzes flue gas for CO_2 content by quantitative chemical analysis. It makes

Foxboro Single Scale Recorder

three complete analyses every minute and these are recorded on a conventional circular chart as a dot for each analysis.

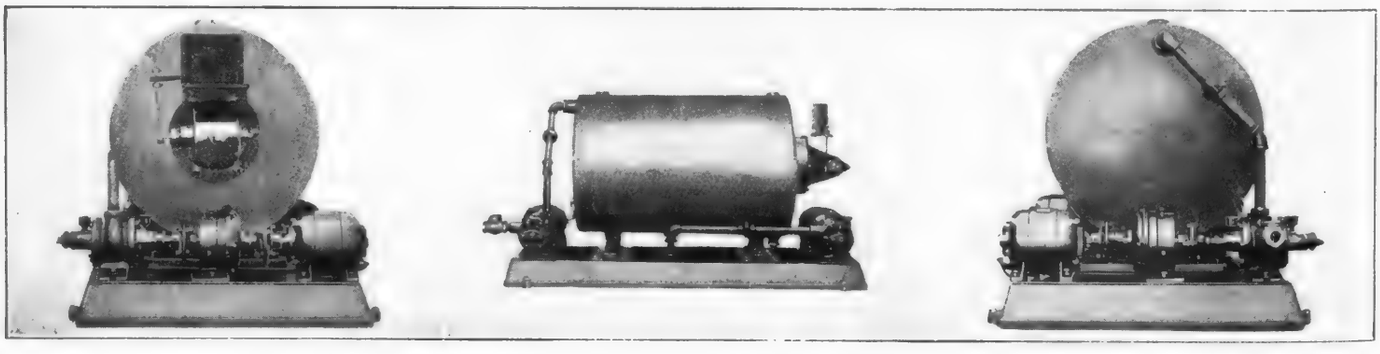
The motive power is a small automatic water pump and there are but three moving parts. The construction is entirely of metal and there are no small orifices to become plugged and no complicated mechanism. The smallest opening through which the gas passes is ⅛-in. and there are no parts to which soot can adhere. The recorders can be supplied with an extra pen to record draft, thus giving both CO_2 and draft records on one chart. This is important on account of the close relationship between draft and CO_2 content. The circular states that one of these recorders will be sent on trial to anyone whose coal bill is in excess of $8000 per annum; under that amount, it is not recommended. Size 8½ x 11 in. Pp. 4.

Foxboro Double Scale Recorder

Foxboro Triple Scale Recorder

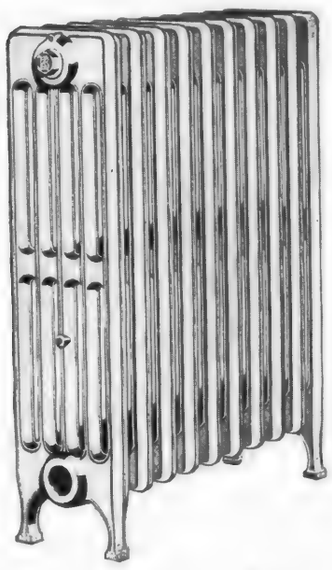
MIDWEST AIR FILTERS in the Federal Reserve Bank of Richmond, Va., are featured in a folder issued by Midwest Air Filters, Inc., Bradford, Pa. In this bank, a total of 52 Midwest units were installed, 40 in the main building and 12 in the annex. During the summer, the fans used are operated at full capacity and for the remaining eight months, fans are operated at about half capacity. It is further stated that the maximum fan capacity in this installation does not make it necessary for the filters to deliver their full rated capacity at any time.

Operating resistance, however, is unusually low, even for the reduced capacity of these installations. During the summer, it is 0.18 in. water gauge and during the winter, 0.08 in. water gauge. In the larger installation of 40 units, two cells are cleaned and recharged with Viscosine twice a week. In the smaller installation of 12 units, one cell is cleaned and recharged twice a week, and a total of 49 gal. of Viscosine is used in a year. There are no other maintenance or operating costs and repair costs have been negligible. The balance of the folder is given up to a description of the desirable features of Midwest Air Filters and details of their construction.



Murdock Return Pump, Vacuum Pump and Receiver

KEWANEE RADIATOR—SLIM TYPE is described in Supplement to Catalog No. 77, now being sent out by the Kewanee Boiler Co., Kewanee, Ill. The Slim Type is a 5-col. radiator, built in 20-in., 26-in., 32-in. and 38-in. heights and containing from 5 to 160 sq. ft. of surface. The sections are 2½ in. thick and only 8-3/16 in.



Kewanee Slim-Type Radiator

wide. The design is devoid of all ornamentation and while it should find large use in public buildings, this type of radiator will also appeal to discriminating housewives, because of its clean-cut appearance and of the absence of dust-catching ornamentation. Size 6 x 9 in. Pp. 8.

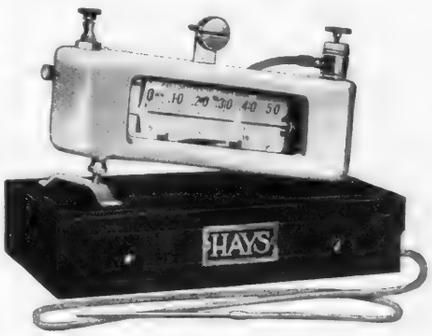
WEATHER VEIN, Vol. 6, No. 2, issued by Carrier Engineering Corp., Newark, N. J. This issue of the *Weather Vein* is devoted to a description of the New Madison Square Garden, New York, one of the most important features of which is the air-conditioning equipment designed and supplied by the Carrier Engineering Corporation. The story is written in the inimitable style of "Jack" Bolling, who under the caption, "The King is Dead! Long Live the King!" tells a facinating story of the inception, building and utilization of the old Madison Square Garden, which, through its specialized use for the specific purposes of mass entertainment, sports and exhibits, became as famous as the Covent Garden of London or the Opera of Paris. Mr. Bolling sketches the many noteworthy events that marked the history of the Garden from its opening by Herr Eduard Strauss of Vienna in 1890, until its demolition in 1924. Mr. Bolling then tells of the inception of the idea of a new Madison Square Garden in the mind of "Tex" Richard and of its construction at a cost of approximately $5,000,000. There follows a complete and very readable description of the general construction of the Garden and its capabilities as a gathering-place for enormous crowds that can be kept comfortable, regardless of what the outside weather conditions are. Naturally, the atmospheric conditioning equipment is described in detail, but the story is not at all technical and forms excellent reading for any one interested in the subject. Size 4 x 7 in. Pp. 48.

AEROFIN folders are being issued by the Aerofin Corp., Newark, N. J., from time to time, each conveying a separate message in regard to the construction and use of Aerofin copper-tube radiation. The first folder is entitled "Introducing Aerofin to Those Interested in Mechanical Ventilating Systems." This is followed by "There's a Generous Mixture of Scotch in Aerofin", "Perfected Details Make the Perfect Product", "Aerofin is a Complete Unit", "Labor is a Big Item", "Better Materials and Less of Them", "Labor is Worthy of Its Higher" and "Hot Air Has Assumed a New Importance."

TAG "CODEX" CATALOG OF INDUSTRIAL THERMOMETERS is the title of a new publication issued by C. J. Tagliabue Mfg. Co., Brooklyn, N. Y. This is a condensed catalog of industrial thermometers, bulb guards, flanges, extensions and complete instructions for ordering. A valuable book of good information on the line it covers. Known as No. 652A. Size 8½ x 11 in. Pp. 48.

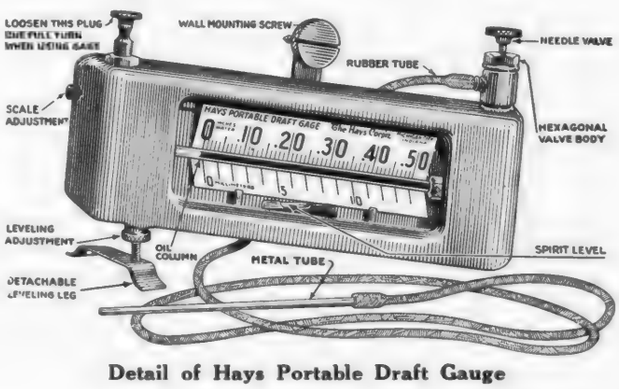
BILGE AND CONDENSATION PUMPS, are the subject of a folder issued by the Chicago Pump Co., Chicago, Ill. It shows the Type L-1 bilge pump in various sizes, with capacities and horse powers, as well as the "Sure-Return" condensation pump with detailed information regarding sizes, tappings, etc.

USE OF THE DRAFT GAGE FOR TESTING CHIMNEYS IN WARM-AIR HEATING PLANTS is the title of a bulletin prepared by Professor A. P. Kratz, of the Department of Mechanical Engineering, University of Illinois, for the Hays Corporation, Michigan City, Ind. An idea of the comprehensiveness of this bulletin may be gathered from the following sub-titles: What is Draft, How a Draft Gage Works, How Draft Affects Chimney and Furnace Performance, How Much Draft Should You Have, How to Use the Draft Gage, Common Causes of Poor Draft and Sources of Air Leakage. The bulletin contains an admirable presentation of the subject and is well illustrated to bring out the salient points. On the front cover is illustrated a Hays portable draft gage, which is designed primarily for the use of furnace and boiler salesmen, engineers and heating contractors. This is a precision instrument, although it weighs less than 2 lbs. and can be carried in the pocket. Size 8 x 11 in. Pp. 4.



Hays Portable Draft Gauge and Case for Transportation

EXCESS AIR IS YOUR BOILER'S WORST ENEMY appears on the cover of a bulletin being mailed by the Foxboro Co., Inc., Foxboro, Mass., descriptive of Foxboro duplex and triplex draft gauges. As is emphasized in the text, the success of the Foxboro draft gauge lies in the simplicity of construction. The movement of the sensitive bronze diaphragm is transmitted to the pointer by a simple lever having a negligible amount of friction and lost motion. The Triplex gauge contains three separate movements, one each for pit pressure, last pass vacuum and furnace draft in positive or negative pressure. The Duplex gauge has two movements designed to indicate draft over the fire and in the last pass.



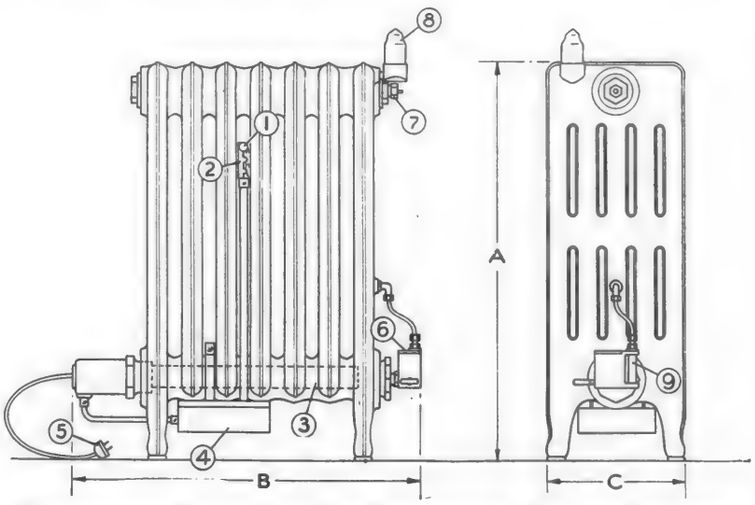
Detail of Hays Portable Draft Gauge

HOW TO SELL PLUMBING AND HEATING EQUIPMENT AS CHRISTMAS GIFTS is the title of a new booklet issued by the T.E.B., containing talking points and suggestions as to prospective purchasers to be approached during the "Red Letter Days" campaign. A live-wire message to the trade, which ought to stimulate the selling effort.

ECONOMY SMOKELESS BOILERS, manufactured by the International Heater Co., Utica, N. Y., are presented in a new catalog issued by the company. The catalog covers sizes, ratings, dimensions, required chimneys and ashpits and shows a multitude of views of buildings in which these boilers have already been installed. New Lincoln radiator discount sheets, effective September 13, pany.

GOETZE GASKET GUIDE is a publication issued by Goetze Gasket & Packing Co., New Brunswick, N. J., in which is presented the story of a specialized development that is of interest to nearly every industry.

Emphasizing the desirability of maintaining tight joints where liquids are being handled, a chart is given showing that, at 50 lbs. pressure, the leakage in 24 hours through a 1/32-in. hole is over 250 gal.; through a 1/16-in. hole, 1100 gal., and through a 1/8-in. hole, nearly 5000 gal.



Electric-Steam Radiator made by Electric-Steam Radiator Company

Shipment of 600 8-ft. Goetze Gaskets

Goetze gaskets are made of many materials; copper, steel, monel, aluminum and lead, some interlined with asbestos. Each metal is selected to afford the best results with the particular service for which it is intended. Every used size is available, and one shipment consisted of six hundred 8-ft. diameter gaskets. One high-duty type is successfully used under 2000 lbs. pressure, and at 2000° F. temperature. The Gasket Guide contains much useful information on the subject, as well as tables of sizes and prices. Size 6 in. x 9 in. Pp. 48.

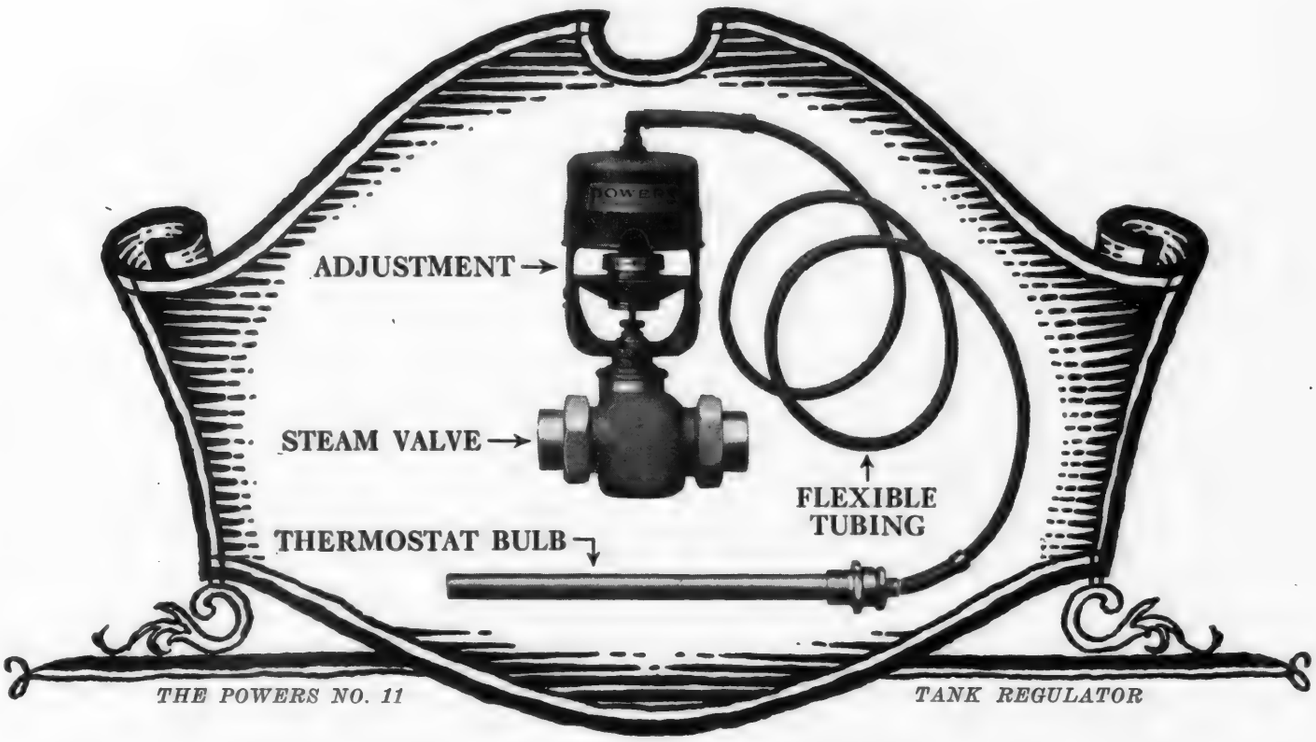
DUNHAM MAGAZINE for October, issued by C. A. Dunham Co., Chicago, Ill., contains an article on float and thermostatic traps by the company's Research Department and a paper delivered by A. L. Sanford at the annual meeting of the National Association of Public School Officials, held in Toronto, Canada, May, 1926, entitled "The Argument for Low-Pressure Heating Plants."

OIL FOR 1000 YEARS is the title of a little booklet put out by the American Nokol Co., Chicago. This booklet is a very fair and a reasonable presentation of data on the question of oil supply and, in particular, refutes the recent report of the Federal Oil Conservation Board in its intimation that there remained only about six years' supply of oil if consumed at the present rate. It also outlines the possible economic production of oil from shales and from other similar sources. There is an interesting section on the use of industrial alcohol from annual crops. The 40 pages in this booklet contain much interesting information to those in the oil-burning industry or to prospective purchasers of oil-burning equipment.

New Type of Electric Steam Radiator

Supplementing the description given in last month's issue of a new type of electric steam radiator, which has been placed on the market by the Electric Steam Radiator Company, 774 Harrison St., San Francisco, Cal., and which is patterned somewhat on the idea of a gas steam radiator, the accompanying illustrations are presented, showing the general appearance and the construction features of this unit.

Installation of Electric-Steam Radiator in Hall of Residence



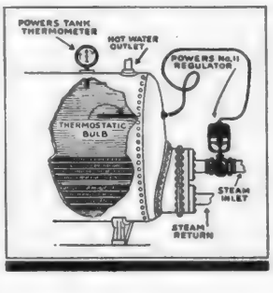
THE POWERS NO. 11 TANK REGULATOR

After testing three other well-known regulators Ipswich Mills standardize on POWERS

Ipswich Mills, established in 1826, is the oldest manufacturer of good hosiery in America. This firm owns a group of large mills in Massachusetts. Because of the large number of temperature regulators used by them they made careful tests to determine which make of regulator was most ACCURATE and DURABLE.

The results of their test are shown in the following letter received from Mr. L. Kleeb, the General Manager.

"We are very pleased to advise that we finally have adopted your regulator after having tried out three other well-known regulators on the market. We find same is giving excellent satisfaction in the way of greater uniformity in bringing through our colors, together with a considerable saving of fuel.



"We are adopting this as our standard equipment when in the need of apparatus of this kind."

This is only one of many similar tests which have conclusively proved the claims we make for the regulator shown above.

"The Best Costs Less in the End"

THE POWERS REGULATOR COMPANY

36 years of specialization in temperature control

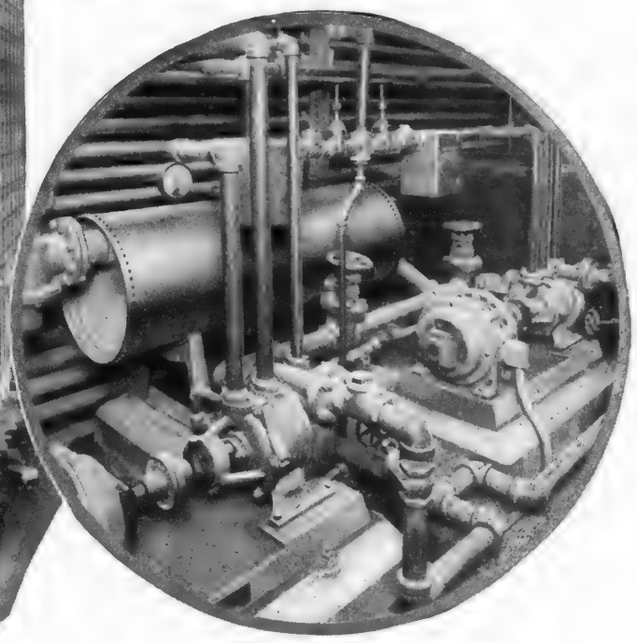
2718 Greenview Ave., Chicago

Atlanta	Charlotte, N. C.	Detroit	Los Angeles	New York	San Francisco	Seattle
Baltimore	Cincinnati	El Paso	Milwaukee	Philadelphia	CANADIAN OFFICES	
Boston	Cleveland	Houston	Minneapolis	Pittsburgh	Toronto	Winnipeg
Buffalo	Denver	Indianapolis	Nashville	Rochester	Montreal	Calgary
Butte, Mont.	Des Moines	Kansas City	New Orleans	St. Louis	Halifax	Vancouver

(3460)

LEFT: *The Hurt Building, Atlanta, Ga. Mr. Otto Goldschmidt, Consulting Engineer, New York, N. Y.; Loftis Heating & Plumbing Co., Heating Contractors, Atlanta, Ga.*

BELOW: *Two motor-driven Jennings Return Line Vacuum Steam Heating Pumps, duplex type, installed in the Hurt Building. Each unit is capable of handling 65,000 sq. ft. equivalent direct radiation.*



Georgia's largest office building *prefers Jennings*

Large buildings, like the Hurt Building in Atlanta, have this heating problem in common—to supply each one of many rooms with the right amount of heat.

And they invariably solve this problem by installing a Jennings Vacuum Heating Pump on the return line. For, by creating and holding a vacuum throughout the entire return piping, the Jennings Pump makes positive and unrestricted steam circulation a certainty.

The radiator farthest from the boiler gets its proper share of heat. So does the nearest radiator. The whole building is heated—not just a few floors.

And more—a Jennings Pump assures satisfactory heating not only one season, but many seasons. It is just as good after many years service as it is the day when installed. And just as economical.

Write for bulletins which give the facts.

NASH ENGINEERING COMPANY

SO. NORWALK **CONNECTICUT**

Branch Sales Offices: Atlanta, Birmingham, Boston, Buffalo, Chattanooga, Chicago, Cleveland, Dallas, Denver, Detroit, Indianapolis, Kansas City, Memphis, Miami, Minneapolis, New Orleans, New York, Omaha, Philadelphia, Pittsburgh, Portland, Richmond, St. Louis, Salt Lake City, San Francisco, Seattle, Tampa, Washington, D. C. **In Canada:** Montreal, Toronto and Vancouver. **European Offices:** London, Eng., Norman Eng. Co.; Brussels, Belgium, and Amsterdam, Holland, Louis Reijners & Co.; Oslo, Norway, and Stockholm, Sweden, Lorentzen & Wettre.

Jennings Pumps

RETURN LINE AND AIR LINE VACUUM PUMPS CONDENSATION AND CIRCULATING PUMPS

Trade and Miscellaneous Notes

Coming Events

December 16-17, 1926. Annual meeting of National Association of Brass Manufacturers in New York.

January 13-15, 1927. Annual meeting of American Engineering Council, Washington, D. C.

January 18-20, 1927. Third Annual Three-Day Institute for Plumbing and Heating Industries at Carnegie Institute of Technology, Pittsburgh, Pa.

January 25-28, 1927. Annual meeting of American Society of Heating and Ventilating Engineers in St. Louis, Mo. Headquarters at Hotel Statler.

February 1, 1927. Opening of permanent International Trade Exhibition, Exhibition Building, New Orleans, La.

February 15-19, 1927. Chicago Power Show, Chicago, Ill.

February 15-17, 1927. Forty-first annual meeting of Engineering Institute of Canada. Opening session in Montreal at the Institute headquarters, January 27, with adjournment to reconvene at Quebec, February 15, 16 and 17.

February 19-26, 1927. New York Annual Own-Your-Home Exposition, Madison Square Garden, New York.

February 21-March 5, 1927. Second Architectural and Allied Arts exposition, under the auspices of the Architectural League of New York, Grand Central Palace, New York. Executive offices, 105 West 40th Street, New York.

March 14-19, 1927. Second National Heating and Ventilating Exposition at Twelfth Regiment Armory, Columbus Avenue, 61st to 62nd Streets, New York.

April 2-9, 1927. Chicago Seventh Annual Own-Your-Home Exposition, Coliseum, Chicago, Ill.

April 5-7, 1927. Annual convention of American Oil Burner Association, in Buffalo, N. Y.

May 10-13, 1927. Eighteenth annual convention of National District Heating Association in West Baden, Ind. Headquarters at the West Baden Springs Hotel.

Miscellaneous Notes

Chicago Oil Burner Association held its monthly meeting November 9 at the Allerton Hotel. A report presented showed that the advertising campaign is progressing satisfactorily and a committee was appointed to investigate and find solutions for the various business problems which continue to arise.

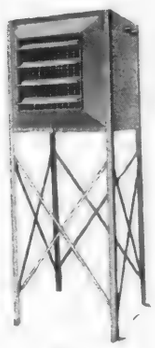
Association of Heating and Ventilating Equipment Dealers of Portland, Ore., was organized early in November. The association was formed for the purpose of promoting good fellowship and co-operation between members through better acquaintanceship. Meetings will consist of luncheons held each Friday noon in the Chamber of Commerce dining-room, Oregon Building. Officers elected consist of: Permanent Chairman, Harry Mead, of the C. A. Dunham Company; secretary and treasurer, E. C. Turner of the American Blower Company.

Eastern States Exposition, held at the Exposition Grounds, Springfield, Mass., September 19-26, was visited by thousands from all over the New England States and was brought to one of the most successful terminations ever experienced. A large number of manufacturers of heating and plumbing equipment were represented including the Grant Oil Burner Corp.; Holyoke Heater Co., Holyoke, Mass.; Electrol, Inc.; Federal Radiator and Boiler Co., through their New England manager, Robert Brown; Super Oil Heator Co., Hartford, Conn.; H. B. Smith Co., Westfield, Mass.; Security Automatic Oil Burner Co.; International Heater Co., Utica, N. Y.; Williams Oil-O-Matic Heating Corp.; B. F. Sturtevant Co., Hyde Park, Mass.;

Low Maintenance

THE upkeep cost of an Autovent Unit Heater is not to be compared with its equivalent of direct radiation. It is far less. Each Unit Heater is separately controlled; capacity can be reduced as required.

Nothing demands attention except occasional oiling of motor bearings.



Right:
Rear View
(Floor Type)

Left:
Front View
(Floor Type)

Quick Positive Heat

A STREAM of hot air issues forth instantly when the fan is set in motion.

Adjustable deflectors control the path of the air. The fan forces it out a distance of 75 to 100 feet before the hot air hits the floor and circulates back through the heater cabinet for re-heating.

Autovent Unit Heaters

Keep These Features in Mind:

1. Motor **NOT** in path of heated air. This eliminates danger of overheating motor. It makes motor inspection and maintenance easy.
2. Carefully Built in **Every** Detail. Equipped with guaranteed motor—ample power. Workmanship throughout of highest type.

Estimates and prices cheerfully furnished.

AUTOVENT FAN & BLOWER CO.
730-738 W. Monroe St., CHICAGO
ENGINEERS IN ALL PRINCIPAL CITIES

American Nokol Co.; Automatic Burner Corp.; Spencer Heater Co.; Wayne Tank and Pump Co.; Industrial Appliance Co. of New England (Bryant Gas Fired Boilers); Rudd Mfg. Co. and Magee Furnace Co.

Central Supply Association held its thirty-second annual meeting at the Hotel Sherman in Chicago, October 20-21. Isidor Weil, president of Weil-McLain, Chicago, was elected president. Among the various matters discussed were increased sales through women's co-operation, the amount of protection to be extended the wholesaler by the manufacturer, the general credit situation and the present value of the National Trade Extension Bureau.

Women's co-operation is expected to be secured through the medium of the General Federation of Women's Clubs and the Home Equipment Campaign which they now have under way. In connection with this, a questionnaire has been issued covering water supply, garbage disposal, heating systems, gas appliances, electrical equipment and recreation, which is to be sent out in all localities for the purpose of collecting data concerning the use or non-use of such equipment and appliances in each section. The information obtained will be valuable to manufacturers and salesmen as an indication of undeveloped territory. It was stated that an appropriation was made by the U. S. Government several years ago for the purpose of obtaining similar data in connection with sanitation only. This appropriation has never been expended owing to the agitation in some quarters to have a heating survey included with the sanitary inquiries. The February meeting of the association will be held at the Palmer House, Chicago, Feb. 23-24.

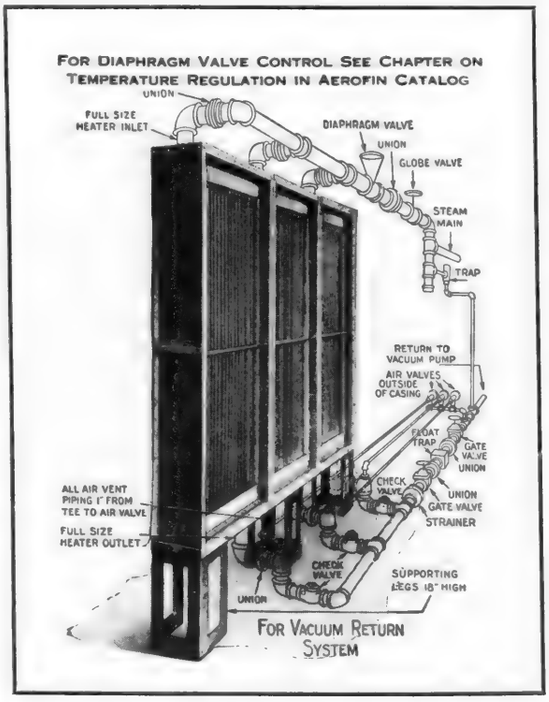
October construction contracts in 37 States, according to the F. W. Dodge Corporation's review of construction activity east of the Rocky Mountains, amounted to $515,726,000, which is a decline of 8% from September (this year) and was 3% less than October of last year. Out of this amount, 44% was residences, 20% public works, 12% commercial buildings, 9% industrial purposes and 4% for educational buildings. In New York and northern New Jersey, the volume was $123,553,000, which is 16% less than in September and 12% less than October a year ago. In New England, the volume was $31,424,200, with decreases of 29% against September and 19% against last year. The middle Atlantic States show $56,917,800, a decline of 9% under September, but an increase of 11% against October last year. In the Pittsburgh district, there was shown only $58,283,000, a decline of 10% from September and 26% from a year ago. The central west is making a fine showing with $171,263,800, which is an increase of 70% over September and 35% over last year. The southeastern states show $48,146,300, a decrease of 16% from September and 37% from a year ago. The northwest has $9,776,300, which is 7% over September and 41% over October, 1925. Texas has $16,361,000, which is 8% less than September, but 53% above last year's records.

National Fire Protection Association plans meetings for the Technical Committee to be held as follows: Safety to Life (Building Exits Code), New York, December, 1926 (E. D. Chapin, chairman, Room 407, Manhattan Building, Philadelphia, Pa.). Dust Explosions, New York, January, 1927 (D. J. Price, chairman, U. S. Bureau of Chemistry, Washington, D. C.).

1926 Electric Exposition, held at the Grand Central Palace, New York, October 20-30, included displays of products made by the following firms connected with heating and ventilating work:

American Blower Company, American Pipe Bending Machine Company, American Radiator Company, Baker Oil Burner Corporation, Copeland Refrigeration Company, Domestic Electric Refrigerator Company, Domestic Stoker Sales Corporation, Thomas Pump Works. The exposition was sponsored by the New York Edison Company.

National Warm Air Heating and Ventilating Association, Columbus, O., is issuing letters through its publicity bureau in the endeavor to arouse public interest in the subject of good heating. These letters are in the form of short stories, which are sent out to the members with the suggestion that they use the story as a basis of a short item, add-



AEROFIN CORPORATION
750 Frelinghuysen Avenue
Newark, N.J.
L. C. Soule, *Sec'y and Sales Manager*

AEROFIN
Fan-System Heating Surface

To Engineers, Architects and Contractors

The Vertical Tube Arrangement of Aerofin is preferred because it guarantees perfect drainage of condensation and is less subject to errors of installation and operation. The Horizontal Tube Arrangement may be used when installed in accordance with our instructions and diagrams.

The Labor Cost of Installing Aerofin is practically nothing. Two men (without tackle) can handle the units and fit them together like building blocks. Why pay 20 cents per foot of heating surface for labor of erecting TONS of cumbersome heaters? Use Aerofin and cut down your installed cost for Heaters.

Aerofin weighs only 1/10 to 1/4 as much as the old fashioned heavy heaters.

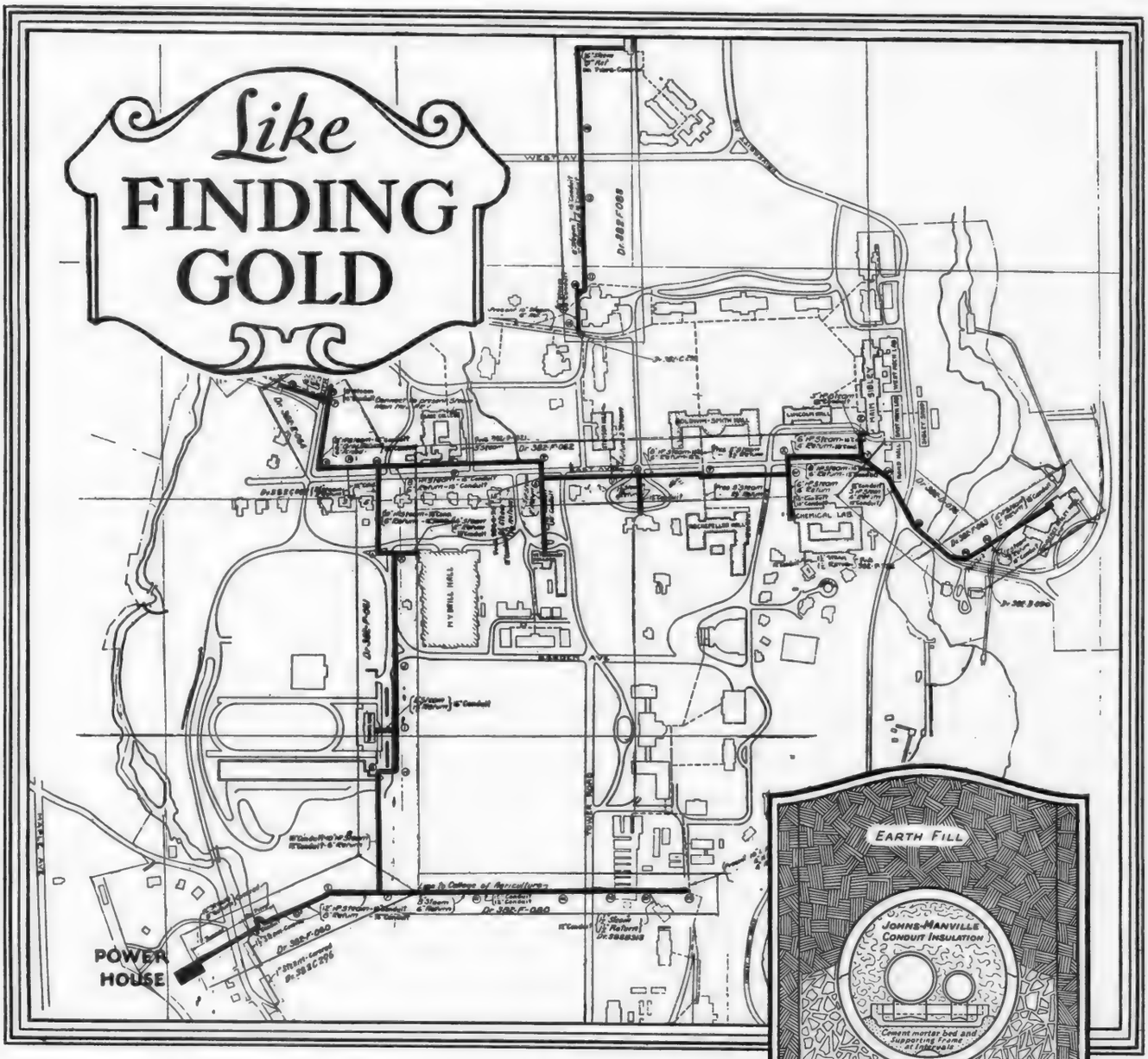
Aerofin saves a great deal of space.

Aerofin is made of non-corrosive metals.

Since there is no equal to Aerofin why not specify it outright? Plans and specifications should show sizes, number and arrangement of units with piping details.

Write for catalog, instruction leaflet and service details.
Aerofin is Sold ONLY by Manufacturers of Nationally Advertised Blower Heating Apparatus.

Like FINDING GOLD


POWER HOUSE
EARTH FILL
JOHNS-MANVILLE CONDUIT INSULATION
Cement mortar bed and supporting frame at intervals
¾" Crushed Stone or Clean Gravel
Bell for Spigot Underdrain

THE Johns-Manville Underground System of Insulation has been a gold mine of economy to its many users.

With 90% efficiency guaranteed on the installation as planned, Cornell University counted on tremendous savings over its previous heating costs on the installation shown above. But tests on 5047 ft. of this 19,400 ft. job showed an efficiency of 92.77%; an *additional* saving of 85 tons of coal a year *on the tested portion alone.*

At less than half the cost of a walking tunnel, the Johns-Manville Underground System of Insulation offers you a highly efficient method of running steam and hot water lines underground. It couples an efficient distributing system to the efficient central power house resulting in maximum economy of service.

JOHNS-MANVILLE INC., 292 Madison Avenue at 41st Street, New York City
Branches in all large cities For Canada: Canadian Johns-Manville Co., Ltd., Toronto

JOHNS-MANVILLE

Underground System of Insulation

COVERS THE CONTINENT
Through
Asbestos
and its allied products
INSULATION
BRAKE LININGS
ROOFINGS
PACKINGS
CEMENTS
FIRE PREVENTION PRODUCTS

ing a little local color where possible, and then persuade the editors of the local newspapers to publish one of these items each week.

New York. Invitations to a national conference on the subject of State supervision of real estate mortgage houses and the development of uniformity in appraisal procedure for construction projects, were issued some time ago to all interested parties by the American Construction Council, of which Franklin D. Roosevelt is president. This conference was held at Mr. Roosevelt's offices, 120 Broadway, New York, November 30, and was for the purpose of securing an expression of opinion from groups interested in this matter.

Fifth Annual Exposition of Power and Mechanical Engineering was held in the Grand Central Palace, New York, December 6-11 inclusive, and included a notable display of heating and ventilating equipment.

Manufacturers' Notes

J. E. Porter Corp., Ottawa, Ill., has purchased patents and manufacturing rights for an oil burner which has been patented and marketed for some time by Phillip Hoffman of Minneapolis, Minn. Mr. Hoffman has been appointed chief engineer of the Porter Corporation's oil-burner division.

Caloroil Burner Corp., New York, has acquired exclusive sales rights to the Todd industrial burner for the United States, excepting Greater New York. The Todd is an industrial burner, which has been used in the marine field for several years and is manufactured by the Todd Dry Dock Engineering and Repair Corporation.

Consolidated Gas Co., New York, has begun the training of graduate engineers to become gas service men, according to the announcement made by Oscar H. Fogg, vice-president, as noted in *Gas Progress* for November. Twelve graduates of six engineering colleges and universities have been selected to undergo a rigorous course of training in gas manufacture and laboratory work. Two separate branches will be followed, the first six men being given a 2½-year term in gas plant operation, doing such work as firing the retorts, installing piping and performing in detail every operation which goes into the production of gas service. The second branch followed by the other six men will consist of a six-months' course of training in the utilization testing laboratory. In this laboratory, new applications of gas are developed and new gas appliances are tested out and approved, according to definite standards of practical operation.

Wayne Tank and Pump Co., Fort Wayne, Ind., has changed its name to the Wayne Company, in view of the several new fields now being covered by the products of the organization, including oil burners, water softeners and electric refrigerators.

Kewanee Boiler Co., Kewanee, Ill., announces the election of A. B. Martin, manager of its Chicago branch, to the board of directors.

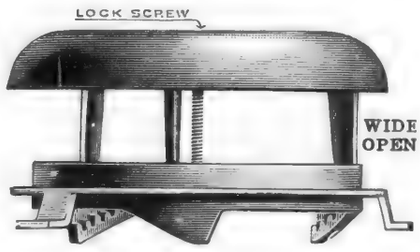
Arthur & Fowler Co., Spokane, Wash., has opened a new branch with 6000 sq.ft. of floor space at Hawthorne and Union Avenues in Portland, Ore. This firm specializes in water heating devices and heating specialties, their headquarters being in Spokane.

Drying Systems, Inc., Chicago, reports that the ventilating system in the Maccabees' Temple, Detroit, Mich., is completely equipped with National air filters, consisting of four units totalling 51,500 C.F.M. The company also advises that the U. S. Playing Card Co., Cincinnati, O., have installed 16 units of Phoenix constant-effect air filters, with a total of 252,000 C.F.M. for the purpose of cleaning the air that dries the coated stock.

Kieley & Mueller, Inc., New York, announces the appointment of Rittelmayer & Co., Bona Allen Building, Atlanta, Ga., as representatives for the State of Georgia for its line of steam, water and air specialties.

Biggs Boiler Co., Akron, O., has appointed E. R. Kyler general sales manager. Mr. Kyler was previously connected for several years with the Leader Iron Works in the sales and engineering departments.

Continental Heater Corp., Dunkirk, N. Y., has appointed W. H. Morris, Jr., north New Jersey representative, with



There Is No Longer Room for Doubt

"This is indeed the Perfect Mushroom Ventilator"

Nu-Notch
REG. U.S. PAT. OFF.

Such is the verdict of a band of experts after a thorough consideration, who were looking for the very finest equipment that money could buy for the new PARAMOUNT THEATRE in Times Square.

The Knowles Nu-Notch was selected for its many good features plus its low cost.

NOTE:

The inside of cap is free from obstructions which prevent the easy flow of air.

Knowles Mushroom Ventilator Co.
202-204 Franklin St. NEW YORK CITY

HARTMANN
RADIATOR BRACKETS

The radiator hangers used in the construction of a building furnish a good guide in determining the quality of the job. Hartmann Brackets are always to be found in a high-class installation because Architects, Engineers and Contractors have experienced that Hartmann Radiator Brackets are accurately and strongly made, are economical and always dependable.

THREE STYLES

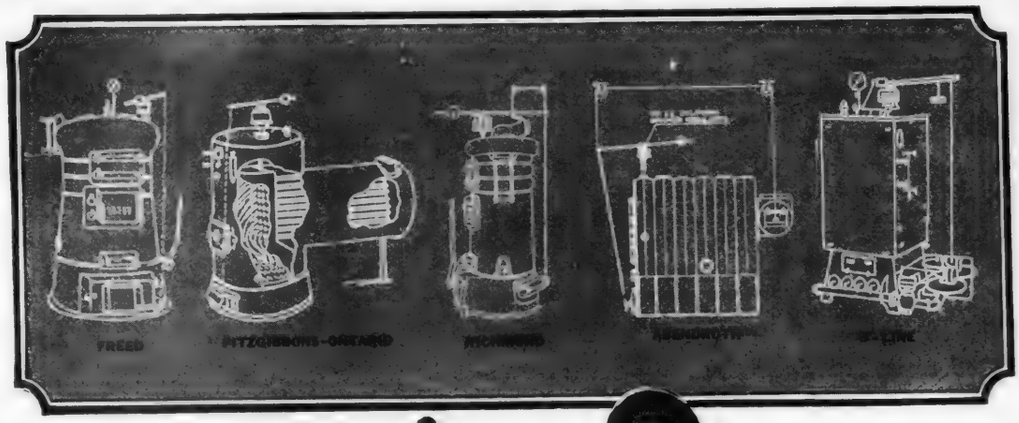
AR NR NV

Write for descriptive circular and price list

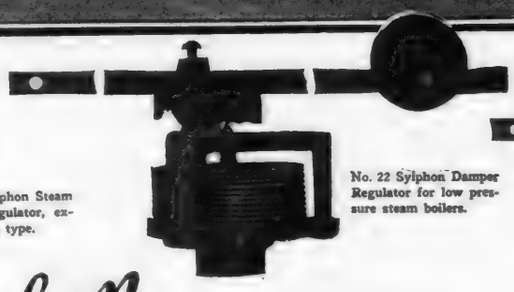
Charles Hartmann Co.
975-993 Dean Street - Brooklyn, N. Y.

Standard Equipment on all these Boilers

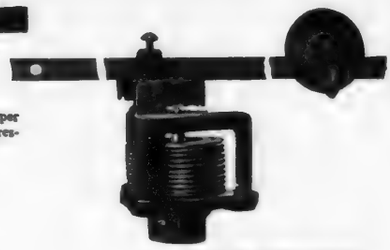
Abendroth	Coatesville	Galva	Kewanee	Oil City	Richmond
Ames	Congress	Heggie-Simplex	L-O	Otis-Sawyer-Economy	Ross
Birchfield	Fitzgibbons-Ontario	Imperial	Lansdale	Pierce-Pebco	Senate
B-Line	Floral City	International-Economy	Molby	Putnam	Standard
Burnham	Freed	Keystone	Novelty	Richardson	Star
Coil			National		Thatcher
					West Coast



No. 924 Sylphon Steam Damper Regulator, extra sensitive type.



No. 22 Sylphon Damper Regulator for low pressure steam boilers.



No. 22-J Sylphon Damper Regulator for low pressure steam boilers with light dampers.

Sylphon Steam Damper Regulators

DON'T OVERLOOK THEIR VALUE ON ANY HEATING BOILER

Ony the sensitive, flexible, all metal Sylphon Bellows used as the diaphragm of Sylphon Damper Regulators can deliver continuous and proportionate response to changes in steam pressure, without "snap action" or "lag". When you install any one of the 35 boilers listed above—you'll find Sylphon Regulators already attached as standard equipment. On all other boilers, you'll find it decidedly to your advantage also to install Sylphon Regulators, because you can assure your customers of uniform heating with low fuel consumption under completely automatic damper control for the life of the boiler. Be sure you get the genuine Sylphon Regulator. Refuse imitations. At the same time, you are assured that you'll never have any servicing troubles with the Sylphon Regulator.

Ask for Bulletin WDR-5.

Every genuine Sylphon bellows is drawn and formed seamless from a flat sheet of specially prepared metal, with folds or corrugations formed to provide the greatest strength and flexibility.

This can be done hundreds of thousands of times—
AND NO APPRECIABLE LOSS OF FLEXIBILITY WILL DEVELOP IN THE ALL METAL SEAMLESS SYLPHON BELLOWS
Sylphon

Breakdown, so common with the ordinary type of thermostat is eliminated, for neither years of constant use nor the powerful action of steam weaken the Sylphon bellows.

THE FULTON COMPANY KNOXVILLE, TENN.

ORIGINATORS AND PATENTEES OF THE SYLPHON BELLOWS

Sales Offices in: NEW YORK, CHICAGO, DETROIT, BOSTON, PHILADELPHIA and in all principal cities in U. S.

European Representatives:
Crosby Valve & Engineering Co., Ltd.
41-42 Foley Street, London, W. 1 England

Canadian Representatives:
Darling Bros., Ltd., 120 Prince Street
Montreal, Canada

headquarters at 31 Clinton Terrace, Irvington, N. J. Mr. Morris was previously connected with Garrison and Heiland, New York.

Buffalo Forge Co., Buffalo, N. Y., announces the appointment of Leon E. Haynes as assistant advertising manager. Mr. Haynes has had an extensive experience in industrial and merchandising lines, as well as in agency, copy and contact work.

National Tube Co., Pittsburgh, Pa., announces that F. N. Speller has been made chairman of the pipe, conduit and fittings division of a committee selected to carry on the standardization work on zinc coatings for iron and steel products.

Illinois Engineering Co., Chicago, Ill., announces that V. W. Leusch of South Bend, Ind., has been appointed as its representative in northern Indiana territory, also that J. Pitcher, formerly assistant to their chief engineer, has been transferred to the sales department and is calling on the Chicago trade.

C. A. Dunham Co., Chicago, Ill., held a meeting of its executives and representatives at a sales conference at the Hollenden Hotel, Cleveland, O., a short time ago. Among those present were Harry Au, Ohio representative; Harold B. Schmidt, western Pennsylvania and western New York representative; A. Tetlow, New Jersey and eastern Pennsylvania representative; O. B. Askren, Indiana representative; R. E. Dunham, general manager; John F. Davis, advertising manager, and T. M. Black, sales manager.

United States Radiator Corp., Detroit, Mich., announces that Russell J. Henry, who has just completed a training period at the Detroit offices of the corporation, will cover the north Philadelphia territory and that James R. Smith, who has previously been connected with their main office, will cover the central portion of Pennsylvania, with headquarters at Harrisburg. A. J. Westerfield, who recently joined the corporation's sales organization, will have charge of the southeastern territory, which is a new field for this organization. Mr. Westerfield's temporary office will be in Birmingham, Ala., where it is intended to open a warehouse at a later date. Previous to his connection with the U. S. Radiator Corp., Mr. Westerfield was for 20 years with the American Radiator Company, the last six being spent in charge of their Atlanta, Ga., office.

Pacific Steel Boiler Corp., has announced that Walter H. Wild, who, as a manufacturers' agent, has previously been selling the products of the Pacific Steel Boiler Corporation and of the General Boilers Company in Philadelphia, has become a member of the general sales force and will have charge of the Philadelphia district, which includes practically all the territory east of Altoona, Pa. Mr. Wild's headquarters will be located in the Land Title Building, South Broad Street, Philadelphia, Pa.

John J. Nesbitt, Inc., Philadelphia, Pa., has removed its executive offices from Atlantic City, N. J., to the company's new buildings at State Road and Rhawn St., Holmesburg Junction, Philadelphia.

New Corporations

Automatic Heating Corp., Louisville, Ky., has been formed to market oil-burning equipment. The directors are Robert G. Wulf, Thomas D. Clines and Edmund P. Wulf.

Detroit-Niagara Heating and Ventilating Engineers, 5677 Grand River Ave., Detroit, Mich. Capital, $10,000.

Federal Plumbing and Heating Supply Co., 130 Federal St., Boston, Mass., has been organized by M. S. Spitz, who was formerly purchasing agent for the State Supply Company.

Central Station Notes

Birmingham, Ala. A demand for an extension of the Birmingham Electric Company's heating mains was recently voiced by property owners on Second Avenue, west of Eighteenth Street, in a petition presented to the city by Monte Ullman, former city attorney. Mr. Ullman said the citizens living in the section mentioned had called on the electric company to extend the lines, but had been given the answer that the lines were now carrying capacity loads and besides this, it would be necessary to increase the main plant. He also called attention to the fact that the new Ritz Theater and the new Thomas Jefferson Hotel had been compelled to install their own heating plants, as the street main does not go beyond Eighteenth Street.

Business Removals

Elliott and Barry Engineering Co., St. Louis, Mo., has removed its offices to 4060 West Pine Boulevard.

Martin T. Hooper, consulting and designing engineer, Los Angeles, Cal., announces that his office is now located in The Heating and Ventilating Building, 2714 South Hill St., Los Angeles. Mr. Hooper is specializing in heating, ventilating and sanitation.

Los Angeles, Cal. The contract for heating, ventilating and plumbing in the new Roosevelt Hotel has been awarded to J. G. Morgan and Company of the same city. This hotel will be twelve stories high, of reinforced concrete construction and will contain 400 rooms.

Mercoids Tells the Truth

The October issue of *Mercoids*, published by the Federal Gauge Co. of Chicago, Ill., has a little item on the back page from which a whole sermon could be preached. It is so good that it will bear reprinting, so here it is:

"For half a century, Louis Williams polished the shoes and brass buttons for the police in one of the New York stations. He recently retired and summed up his 'success' theory in these words:

"All this success stuff is a lot of bunk. What does it get you? I see the 'successful' ones every day, riding in their limousines. Look at their faces. Are they jolly like mine? No! They're always worried. Tomorrow I quit this job. . . I've got a cottage over in Green County. . . What more could I want?"

MANUFACTURED WEATHER
makes
"Every day a good day"
Humidification · Dehumidification
Heating · Ventilation · Purification
Drying
Carrier
Engineering Corporation
750 Frelinghuysen Ave. Newark, N. J.
Boston Cleveland Chicago New York Philadelphia Los Angeles Kansas City
SEE OUR DETAILED DATA IN A.S.H.&V.E. GUIDE
SEE OUR DETAILED DATA IN A.S.H.&V.E. GUIDE

A New Short Cut in Installing Column Radiators

YOU'RE well acquainted with the causes of trouble and delay in installing the legless type of radiator. Note how they are reduced by several special features in the new Grinnell Column Radiator Bracket.

It has only three points of contact; thus reducing the extent to which rough walls can slow up installation.

Only one bolt is required to secure it firm and fast.

An unusually wide range of adjustment is provided—both vertically and horizontally. Need for extremely accurate, time-wasting measurements is eliminated.

All these points are clearly illustrated in the descriptive pamphlet on this rugged time-saving bracket. Send for a copy or copies. Address Grinnell Company, Inc., 280 West Exchange Street, Providence, R. I.

GRINNELL

Brackets, Fittings, Hangers, Valves,
Pipe Bending, Welding, Piping Supplies, Etc.

New York Technical Men Organize

Over 1000 men mostly from the various Engineering Bureaus of the city departments, attended a mass meeting at the Labor Temple, New York, November 8, where the Union of Technical Men, Local No. 37, invited them to join the organization, which is affiliated with the American Federation of Labor.

The Union of Technical Men was originally organized in 1919, but never showed any great sign of activity until July of this year, when increasing dissatisfaction among technical men resulted in 350 new members being taken in, principally from the city Board of Transportation.

The membership is now over 1000 and is drawn largely from the ranks of the city employees, particularly from the Board of Transportation where salaries are claimed to be unreasonably low. In such positions, draftsmen receive as little as $22 per week and $2200 per annum is rated as a good salary for an engineer who is responsible for the design of bridges, canals, subways, etc.

It was brought out at the meeting that while mechanics' wages had increased 235% since 1914, those of technical men had advanced only about 75%.

Leaders of the union state that technical societies have attempted to elevate the engineer, but have done but little for the rank and file of the profession. For this reason, a large number of technical men have turned to the union and to the American Federation of Labor as a source of relief.

Organization work is now progressing in the Borough of Queens in the Highway, Sewer and Topographic Divisions and in the Borough Presidents' organizations of both Manhattan and Brooklyn.

College Degrees for the Plumbing and Heating Trades

The plumbing and heating trades are watching with great interest the scheme being worked out by Professor S. E. Dibble in the College of Industries of the Carnegie Institute of Technology, Pittsburgh, Pa. This is nothing more or less than a course from which, after graduating, the students will be entitled to place after their names B.S. (bachelor of science), M.S. (master of science) or S.E. (sanitary engineer). While the M.S. degree has not been definitely decided upon, it will indicate, if used, a higher degree in plumbing and heating than the other two designations.

It is stated that there are now about forty students enrolled in the B.S. course and thirty-five in the short plumbing (S.E.) course. Those who succeed in obtaining the M.S. degree will be experts in plumbing and in heating and ventilating and the college is encouraging them all to go into business themselves, either as workmen or as contractors.

It is strongly felt that the right to place the initials of the various degrees after the names of the graduates is going to raise the graduates and their business to a higher plane and will cause them to be looked upon in a different light from which plumbing and heating men are now generally regarded. It is the idea to place them on an equal footing with the other recognized professions, but to do this only when the study and education and intelligence of the graduate so warrant.

Instruction in Warm-Air Heating

Young men desiring to obtain instruction in warm-air furnace heating should investigate the two months' intensive course for young college graduates, which has been inaugurated by the Warm Air Furnace Fan Company of Cleveland, Ohio, under the direction of J. C. Miles.

Students in this course will be trained in engineering, designing, installation and salesmanship and upon completion will be turned over to warm-air furnace manufacturers who desire to obtain trained men capable of solving intricate warm-air problems, as well as having ability to sell to dealers.

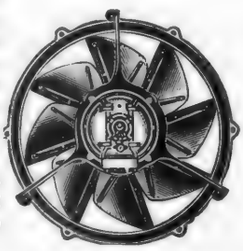
Opportunity:

A highly modern manufacturing plant in the Middle West doing an extensive but somewhat seasonal electrical specialty business, is willing to consider manufacturing and stocking for others or under patents owned by others, specialty articles which can be sold to the Oil Burner and Refrigeration Industries.

Address Box 124,
care Heating & Ventilating Magazine Co.,
1123 Broadway, New York, N. Y.

JAMES M. SEYMOUR
Established 1888
Lawrence St., Mechanic St. and Kirk Place,
NEWARK, NEW JERSEY

AUDITORIUM FANS, 36" to 120" to fit any square opening. SEYMOUR FANS sold subject to substantial discount. Furnished with suitable pulley or coupling for direct connection TWIN FANS include shafting and center bearing.



Special Fans for Cooling Towers, Heating Systems, Induced Draft, Forced Draft, Dry Rooms, Dry Kilns.

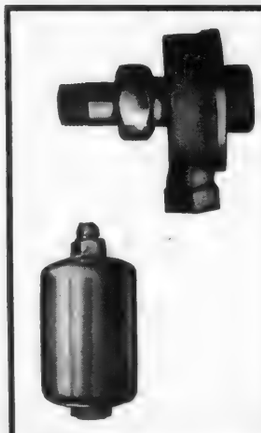
SEND for BULLETINS, PRICES, and DISCOUNTS

A Dependable Line of Heating Specialties

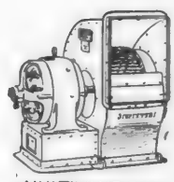
Stay-Rite Heating Specialties are dependable because they are made right and in strict accordance with heating requirements. They have long since passed the experimental stage. And over many heating seasons they have justified the confidence of their owners and proved the high efficiency of the Stay-Rite Line.

Write for literature and prices.

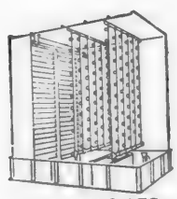
The Ideal Heating Equipment Co.
1250 West 4th Street CLEVELAND, OHIO



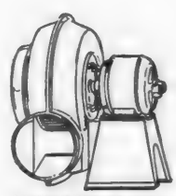
Sturtevant Silentvane Fans have a total efficiency of over 80%


MULTIVANE FAN

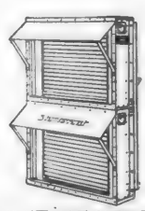
Constantly increasing is the demand to the engineer that operating costs be kept down to a minimum. Sturtevant offers one very effective answer to the problem—the Silentvane Fan.


AIR WASHER

Sturtevant Silentvane Fans have a total efficiency of over 80%. They cut operating costs from 25 to 30%. Several other of their important advantages are stated in the panels below.


VENTILATING SET

In our catalog No. 290 these highly efficient fans are completely described and much helpful engineering data is given. Your request for a copy would be welcomed.


UNIT HEATER

B. F. STURTEVANT COMPANY, HYDE PARK, BOSTON, MASS.

Atlanta	Charlotte	Dallas	Indianapolis	Montreal	Rochester
Boston	Chicago	Denver	Kansas City	New York	St. Louis
Buffalo	Cincinnati	Detroit	Los Angeles	Pittsburgh	Salt Lake City
Camden	Cleveland	Hartford	Minneapolis	Portland	San Francisco
Seattle		Toronto		Washington	

Over 80% Total Efficiency

Cuts Operating Costs 25 to 30%

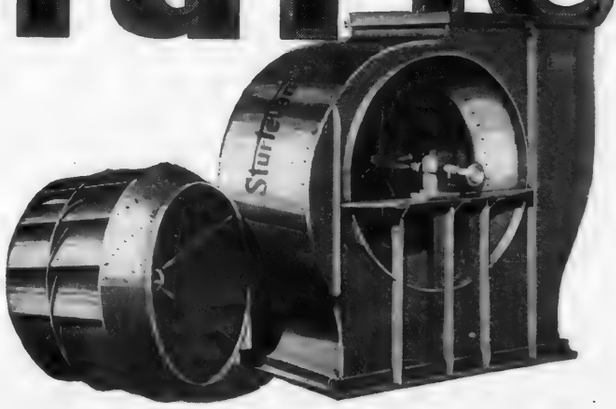
Self Limiting H.P. Characteristic

20% or more Saving in Motor Cost

Quiet as a Slow Speed Fan

Sturtevant

REG. U.S. PAT. OFF.



Silentvane HIGH SPEED *Fans*

Heating Homes with Gas in Topeka

Interesting data on the cost of heating homes with gas in Topeka, Kans., under the comparatively new three-part rate, are given in an article, prepared for the A.G.A. Monthly, by Fred Karr, director of public relations, of the Gas Service Company, Topeka, Kans.

It appears that in February, 1925, the company secured the permission of the Public Service Commission to offer 200 customers the opportunity to try out the so-called "reservation rate." This rate consists of a charge of 75c per month per customer plus 32c per cubic foot per hour of maximum requirement per year, plus 40c per 1000 cu. ft. meter gas charge.

As the result of the general satisfaction of customers as expressed in hearings before the commission, the company has recently been granted the opportunity of adding 900 customers at this rate.

The company states that if it were permitted to earn an amount sufficient for depreciation and a fair return upon the reasonable value of the property, based upon the amount of gas used by the customers in 1925, it would be compelled to charge on a flat rate basis $1.22 per 1000 cu. ft. as metered on the customer's premises. Obviously, this is too high a rate under which to develop house heating and, in view of the fact that the owner of a gas-fired heating plant is practically a quantity purchaser, the three-part rate has been developed.

With an average price per 1000 cu. ft. at present in Topeka, under the old scale of 97½c, it is interesting to note that the average price per 1000 cu. ft. to 191 customers, under the new rate was 63c, at which price a well-built home can be heated with gas at a reasonable cost, taking into account the convenience of this method of heating.

Mr. Karr gives some interesting figures in his story. Of the 191 customers, 34% are in the laboring class. The average consumption of this class of customer in a year's time was nearly 28,000 M. cu. ft. The average consumption per customer per year under the old rate is less than 50,000 cu. ft. As the

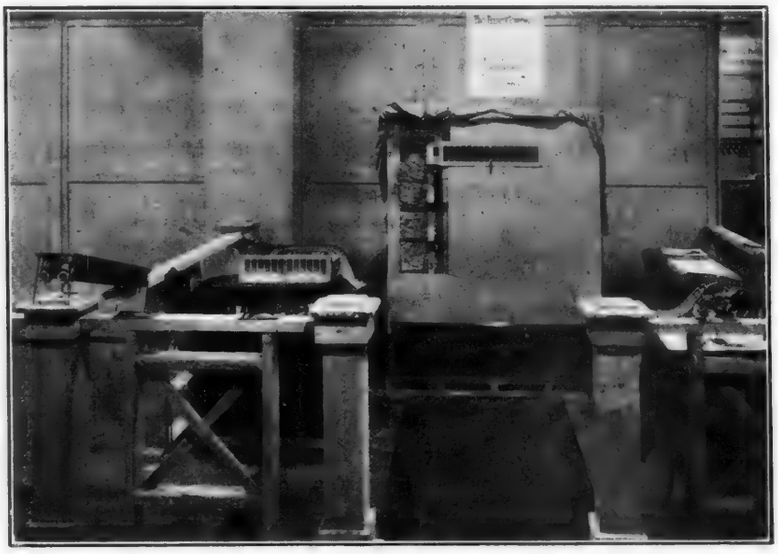


Exhibit of Typical Wall Construction with Built-in Trane Heat Cabinet

Service *The* *Satisfaction*

VECO SYSTEM of VAPOR HEATING

Is the result of 21 Years of Specialization in Vapor Heating
ounces pressure — modulation — perfect regulation.

VAPOR ENGINEERING COMPANY

PHILADELPHIA—10 So. 18th Street
J. Wilbur Glassey—M. S. Buck

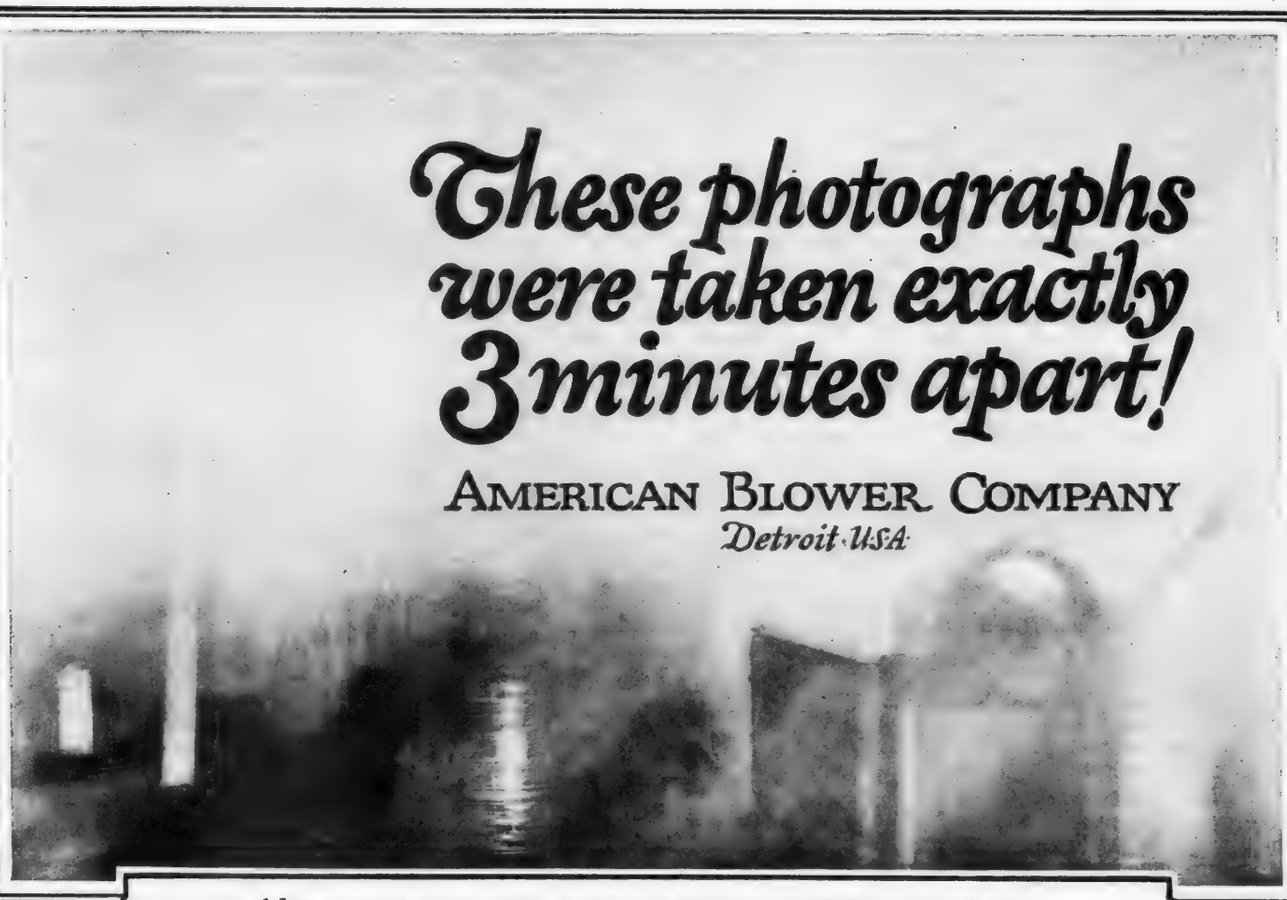
NEW YORK—489 Fifth Avenue
Chas. E. Scott—R. C. Willis

Engineers:

Before You Specify! Investigate

Duro Feather Weight Wafer

DURO AIR FILTER COMPANY 3151 SHIELDS AVE. Chicago



Above—Dye house with American Blower Ventilation turned off.
Below—Same room exactly 3 minutes after starting American Blower Ventilating Equipment. Your ventilation can be cared for as easily, quickly, and efficiently as this with American Blower Equipment. Write for complete information.

(574)

new class of customers thus consumes 600 times as much as the average under the old classification, it is evident that the new customer is, comparatively speaking, a wholesale consumer of gas and this feature justifies the difference in price to the two classes of customers.

It is stated that in Ottawa, Canada, where the three-part rate has been in operation since 1919, the average cost of gas to all consumers is 70c a 1000 cu. ft., which is quite a contrast to the average price in Topeka of 97½c.

It would seem that in this instance, at least, the three-part rate fairly applied works out to the advanage of all parties concerned.

Warranty of Heating Plant Held Limited to Specified Radiation

In an action for the balance due on a contract for the installation of a heating plant, and for extras, it appeared that the plaintiff agreed to install a steam boiler and 400 sq. ft. of radiation in the defendant's store and dwelling house. The contract contained a warranty that the apparatus specified would heat the rooms to 70° F. in coldest weather. After the plaintiff had begun work under the contract, the defendant decided to have radiators placed in two rooms which were not included in the contract and to install a hot water tank. This additional radiation amounted to 145 sq. ft. In December the defendant complained that the boiler was insufficient to heat the premises, and the plaintiff installed a larger boiler.

The trial court found as a fact that the first boiler was sufficient to satisfy the warranty with only 400 sq. ft. of radiation, but was not sufficient with 545 sq. ft. It was further found that the radiation specified in the contract was sufficient properly to heat the premises. The court's ruling, as a matter of law, that the warranty did not apply to the installation as completed, gave a verdict for the plaintiff. The defendant excepted to the ruling. The New Hampshire Supreme Court held, Richardson & Cameron Co. v. Lahout, 134 Att. 349, that by the terms of the contract the warranty was expressly limited to 400 sq. ft. of radiation, and no evidence was reported from which any extension of this warranty could be found. The defendant's exceptions were therefore overruled.

Chicago Gets Next Gas Industry Convention

At the eighth annual convention of the American Gas Association, held at Atlantic City, N. J., October 12-15, it was agreed, during the closing session, that the next convention will be held in Chicago during the week of October 10. Headquarters will be at the newly-completed Stevens Hotel.

Operating Data in October Issue Referred to Industrial Type Only

Through the omission of a sub-caption to an article in the October issue entitled "How to Operate an Oil Burner" by W. H. Wallerskirchen and C. E. Bronson, the title did not indicate with sufficient clarity the fact that the article referred only to industrial burners and not to the domestic type.

No Proof of Improper Placement of Radiator and Connections

In an action by a tenant against his landlord for damages to furniture from the escape of steam from a heating system, it was held, Radice v. Einsidler, 125 Misc. (N. Y.) 815, 211 N. Y. S. 570, that the evidence did not establish that the accident was caused by the defendant's negligence where there was no defect in the coupling that broke, nor any proof that the radiator and coupling were improperly placed. The testimony of an expert that the accident would not have happened if things had been in proper place was not proof of an improper placement. There being no proof of a defective condition or an improper placement, there was nothing that an

Specify

Powell Valves

For Long Uninterrupted Service

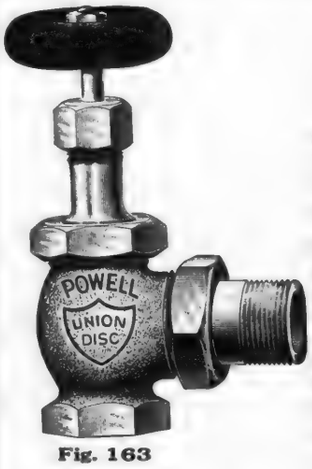


Fig. 163

POWELL COMPOSITE DISC VALVES

are furnished with bronze body and trimmings or in Iron Body with Bronze trimmings.

Bronze valves with union outlets are obtainable for both hot water and steam heating installations.

Discs are interchangeable with all standard vulcanized discs. However, we recommend Powell.

Descriptive circular on request.

THE WILLIAM POWELL COMPANY

Dependable Engineering Appliances

2521-2531 Spring Grove Ave., Cincinnati, Ohio

VALVE MAKERS FOR OVER FIFTY YEARS

You can see it work and test it by hand

Booth 267
New York
Power Show

The Davis Pressure Regulator is distinctive in its design and its operation. It provides automatic reduction of boiler pressure to the correct service pressures for heating, auxiliaries, process uses of steam, etc., and does this by simple, reliable principle of operation.

Pressure is balanced by weight, and there are no springs, diaphragm, packing, or other details to cause trouble. The counterweighted lever makes the action of the Davis Regulator visible, and it may be tested by hand at any time. Close regulation is consistently maintained.

Send for the Davis catalogue and get the detailed description.

DAVIS VALVE SPECIALTIES

STEAM SAVERS SINCE 1875

G. M. DAVIS REGULATOR CO., 436 Milwaukee Avenue, Chicago, Ill.

H&V 12-Gray

—for high pressure

"HEAT WITH UNIT HEATERS"

Where you have steam at pressure up to 150 lbs., the Buffalo Hi-Pressure Unit Heater is the heater you'll want. Designed for floor mounting as shown it takes up very little space in proportion to the area heated by each unit. Outlet connections may be one, two, three or four-way. Carefully designed to prevent friction and to deliver the right velocity.

"Buffalo"

Hi-Pressure Unit Heaters

"More heater for less money—better heating with less steam—more uniform temperature with less regulation"—that's the whole story of Buffalo Hi-Pressure Units. Sturdy, rigid housing, steel piping for radiation, Buffalo Conoidal Fan for air distribution, and carefully engineered construction throughout account for the high efficiency.

One company uses more than a hundred of them

To investigate this heater is to buy it. While it is a recent development pioneered by "Buffalo", one company has already purchased more than a hundred and twenty Hi-Pressure Units!

For economy, simplicity, durability and heating capacity—compare the Buffalo Hi-Pressure Unit with any heater made.

We are able to make quick shipment on several sizes—Wire or write for details NOW!

Buffalo Forge Company

480 BROADWAY, BUFFALO, N. Y.

In Canada: CANADIAN BLOWER & FORGE CO., Ltd., Kitchener, Ont.

inspection would have disclosed. No complaint had ever been made regarding the radiator or its connections. While the fact that the accident was not one of frequent occurrence, would not necessarily defeat recovery, the proof also showed that it was one that was not to be expected to happen. Judgment for plaintiff was reversed and the complaint dismissed.

WANTED

Advertisements under this heading, $2.00 per inch, payable in advance. A 1-in. advertisement contains 35 words. To secure insertion copy must be received not later than the 20th of the month preceding date of issue.

SALESMAN WANTED—Experienced salesman for Detroit district by established low-pressure heating boiler manufacturer. Splendid opportunity for ambitious man. Address Box 121, care of Heating and Ventilating Magazine.

SALES ENGINEER WANTED—Sales engineer wanted for Metropolitan district of Newark and surrounding territory for heating specialties and temperature-control apparatus. Prefer man already with an allied line to handle as side line. Address Box 122, care of Heating and Ventilating Magazine.

SALES MANAGER WANTED—Sales manager for nationally-advertised and distributed product in the heating and ventilating field; must show capability through past performance in handling similar products and should have engineering training; in writing, give complete details as to training, experience and remuneration. Address Box 123, care of Heating and Ventilating Magazine.

SALES REPRESENTATIVE — Experienced representative covering architects and heating trade in Western New York invites correspondence from manufacturer with the view of additional line on commission or other arrangement. Address Box 129, care of Heating and Ventilating Magazine.

POSITION WANTED—Experienced heating estimator and installation superintendent desires connection with heating concern. Available January 1, 1927. Address Box 125, care of Heating and Ventilating Magazine.

POSITION WANTED—Capable, competent and efficient heating and ventilating engineer and estimator wishes to make a change. Practical experience and thorough theoretical knowledge. Able to superintend and handle men to the best advantage. Address Box 126, care of Heating and Ventilating Magazine.

REPRESENTATIVE WANTED—By January 1, 1927, competent sales representative for Buffalo and vicinity, for low pressure heating boiler. Address Box 127, care of Heating and Ventilating Magazine.

SALESMEN WANTED—Radiator and boiler salesmen. Give previous experience in first letter. All applications will be held in strict confidence. Address Union Radiator Company, Johnstown. Pa.

MANUFACTURER'S REPRESENTATIVE—Manufacturer of complete line of fans, air washers and unit heaters desires recognized representatives on commission basis. Address Box 128, care of Heating and Ventilating Magazine.

Attention Heating Men

Use these long evenings to enlarge your Trade Knowledge in a comprehensive and systematic manner—in Plan Reading, Drafting, Estimating, Design and Engineering, Contracting.

We can Coach you in the Full Industry, or in any Specialized branches, or in a mixture of Heating, Plumbing, Business Subjects. We can provide you with a program that will enlarge your opportunities for greater service wonderfully.

We Coach You In Your Own Home, Personal, Clear, Direct.

Full information about any subject sent free. Indicate your choice of Course when writing.

HEATING AND VENTILATING ENGINEERING

SPECIAL STEAM AND WATER HEATING

SCIENTIFIC WARM AIR HEATING

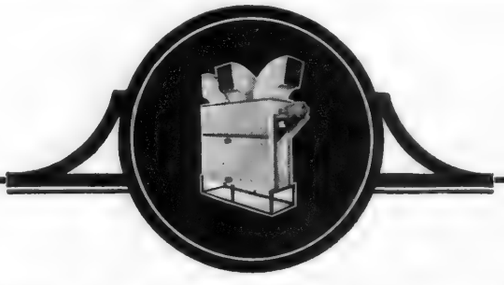
PLUMBING AND SANITARY ENGINEERING

CONTRACTING AND ESTIMATING

MECHANICAL DRAFTING

Make your spare moments earn you dividends

ST. LOUIS TECHNICAL INSTITUTE
4543 Clayton Avenue, St. Louis, Missouri



Heat with Unit Heaters

The widespread application of York Unit Heaters is indicated by the following which were installed by Wm. Steele & Son, Engineers in Philadelphia.

(1) Quaker Hosiery Co., Philadelphia. Three Units in Dye House.
(2) Steel-Heddle Mfg. Co., Philadelphia. Three Units in Machine Shop.
(3) Thornton-Fuller Co., (Dodge Bros.), Ardmore, Pa. Two Units in Garage.
(4) Artcraft Hosiery Co., Philadelphia. Four Units in Full Fashioned Hose Mill.
(5) American Road Machinery Co., Kennett Square, Pa. One Unit in Shop.

There are profits to be made by the Heating Contractor, in York Installations. Literature on request.

Address

York Heating & Ventilating Corp.
1508 Locust Street, PHILADELPHIA

YORK UNIT HEATERS

TURTLEBACK
TRADE MARK

PAT. NOV. 28, 1922

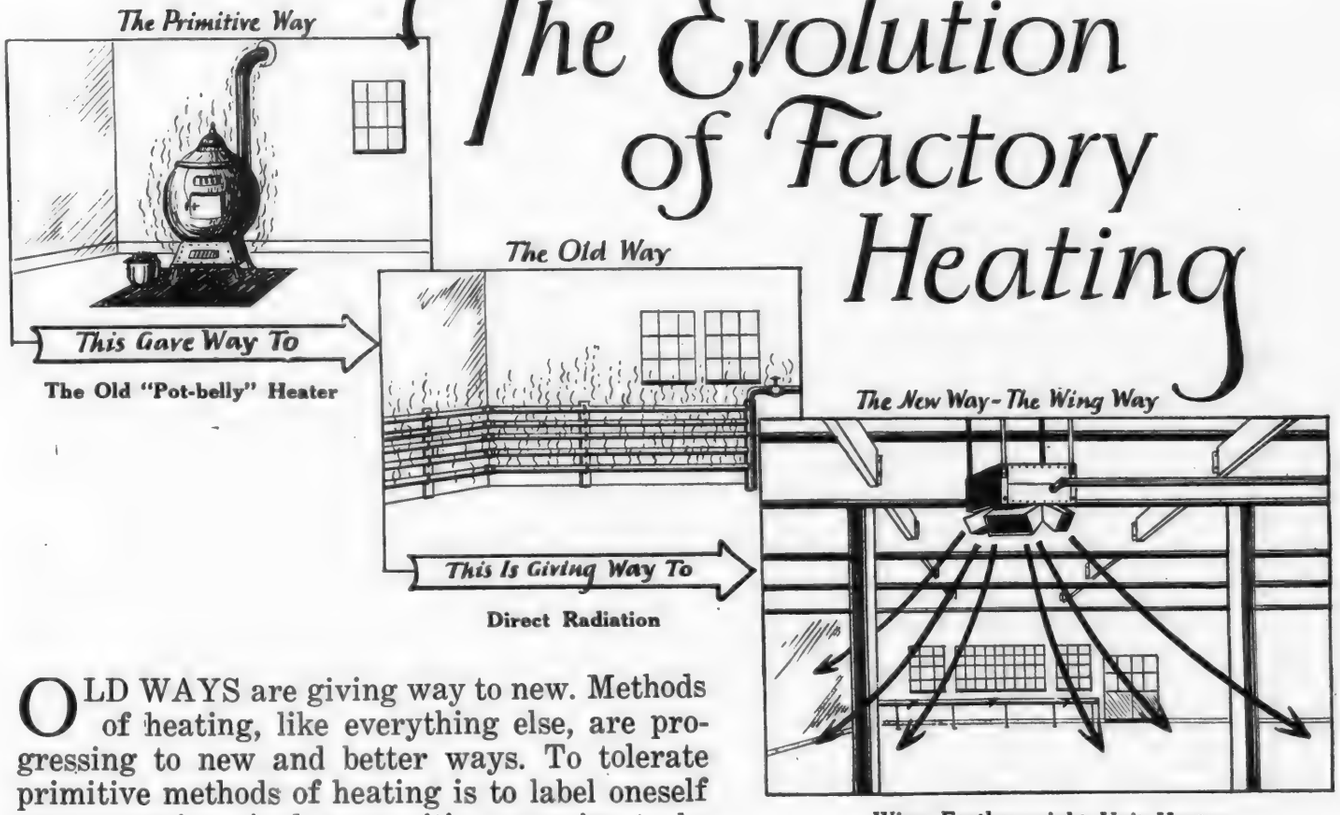
It is vitally necessary that the air of a theatre, school or auditorium be regulated—the free flow of air provided—the overflow checked.

"TURTLEBACKS" are highly advantageous for the fan system used in buildings like and similar to those mentioned, where close regulation and free air flow are demanded.

Regulation of "TURTLEBACKS" is achieved by means of three supporting webs, graduated to 1/16 in. variations in the height of the opening, and held rigidly in place by the central locking screw. ***Let us send full details.***

VENTILATING PRODUCTS CO.
Not Inc.
2800 Cottage Grove Avenue, CHICAGO, ILL.
Exclusive Territory Open to Representatives.

The Evolution of Factory Heating


The Primitive Way
This Gave Way To
The Old "Pot-belly" Heater
The Old Way
This Is Giving Way To
Direct Radiation
The New Way - The Wing Way

Wing Featherweight Unit Heater

OLD WAYS are giving way to new. Methods of heating, like everything else, are progressing to new and better ways. To tolerate primitive methods of heating is to label oneself unprogressive. And worse, it's expensive to be archaic when it comes to matters of heating. Industry all along the line is swinging to the modern practice of industrial heating.

Heat with Wing Featherweight Unit Heaters

Wing heating units *put heat where it is wanted.* The production floor and working level are heated and *kept* heated by Wing Featherweight Unit Heaters. Heavy strata of highly heated air at the ceiling—representing waste—are eliminated.

Wing Operation

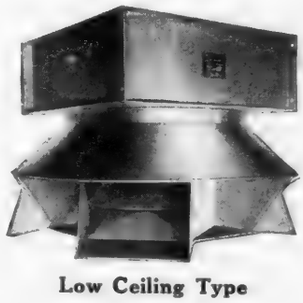
Located well overhead, Wing units take the air at the ceiling, heat it in the small copper heating tubes, and then force this heated air to the working level, which it warms comfortably and uniformly. Briefly, this is the story of Wing heating logic. It results in better heating—at less cost, too! Shorter warming-up periods and quick removal of cold spots. Neither hot nor cold areas. Walls and sunlight are unobstructed, making a clear and light production floor.

Easy Installation

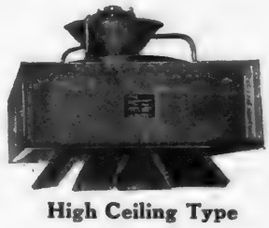
Installation of Wing Heaters is remarkably simple. As their name denotes, Wing Featherweight units are light and compact. They are suspended from ceiling girders or rafters. Steam and return lines are run overhead. No pipe trenches, no sub-grade boiler rooms, no building alterations.

For supplementing an existing system, to warm former cold areas, or for heating a new portion or addition of the plant, there is no more ideal equipment than Wing Heaters.

The Wing Heater Catalog outlines the advantages of the Wing method of heating, and contains tables of capacities and engineering data on the different types of Wing units. Write for the catalog, without obligation, and we will gladly send you a copy without delay.



Low Ceiling Type



High Ceiling Type

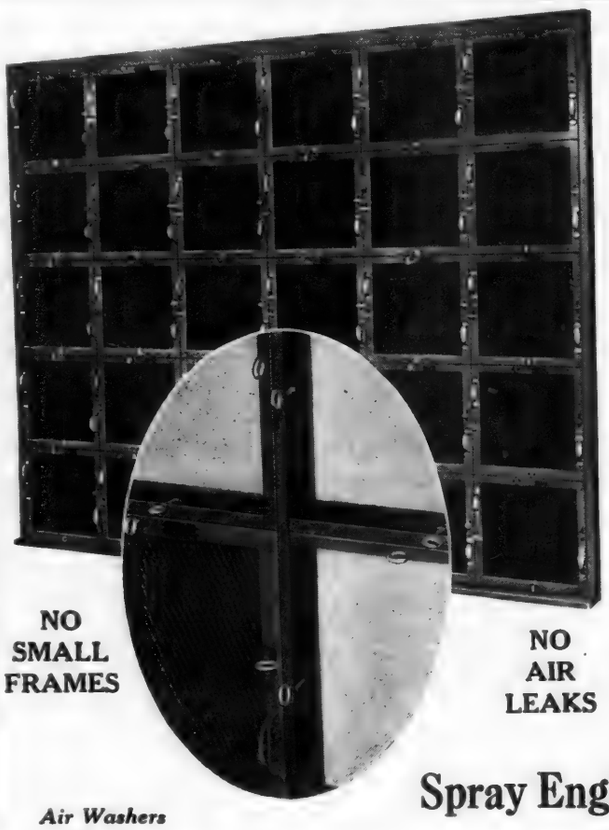
Medium Ceiling Type

Fans
Turbines
Exhausters
Forced Draft Blowers

L. J. Wing Mfg. Co.
Hudson and 13th Sts.
New York City

See Wing Display at New York Power Show, Booth 61

HEAT
with Unit Heaters



SPRACO
AIR FILTERS

Embody Such Features as—

CORRECT MEDIA PRINCIPLE with resultant high cleaning efficiency. Maximum dust collecting surface area with low resistance. Ample space for retention of accumulated dirt.

MULTIPLE SECTION FRAMEWORK —Vertical members extend continuously from top to bottom. Horizontal members welded to vertical members for increasing strength and rigidity. Minimum erecting expense and no chance for air leakage through framework.

TWO POINT SEAL between cell and framework. All air must pass through filter media.

QUICK ACTING SPRING LATCHES for locking cells in framework. Facilitates removal and replacement of cells in framework.

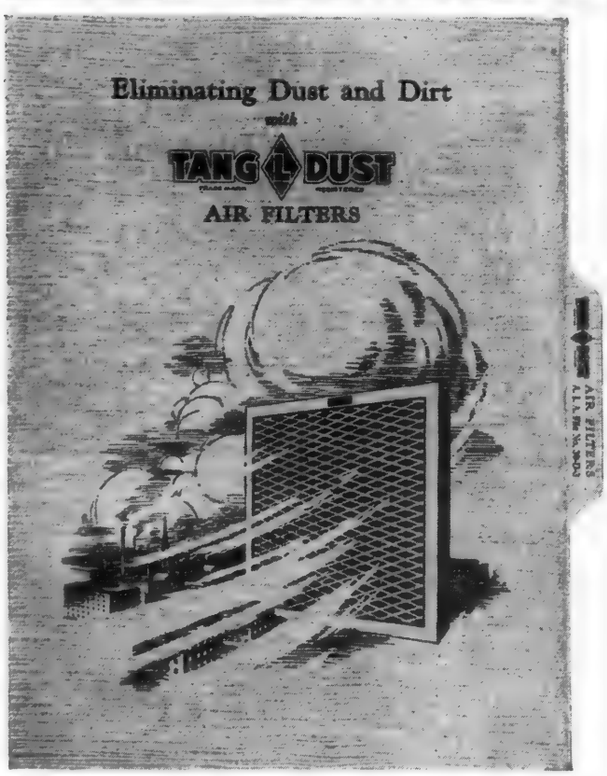
ROTARY WASHING TANKS for large installations. These tanks for cleaning filter cells insure complete removal of all accumulated dirt from filter media with a minimum amount of effort. The rotary tanks like all SPRACO washing tanks are equipped with a water heater ready to connect up to a steam line.

Spray Engineering Company

60 High Street
BOSTON, MASSACHUSETTS

Air Washers
Air Coolers
Spray Nozzles

Cooling Ponds
Flow Meters
Strainers



Free to Ventilating Engineers

Tear out this advertisement, attach to your letterhead and mail to **The Cooling Tower Co., Inc., 15 John St., New York City.** Booklet contains valuable information for those handling air filtering problems.

In Hospitals

Radiators Wall-hung with **Little Giant** *Hangers*

There is no compromise with complete sanitation where radiators are wall-hung with the Little Giant Hanger. It is impossible for dirt to gather unnoticed under the legless radiator. Wall-hung radiation also increases heating efficiency.

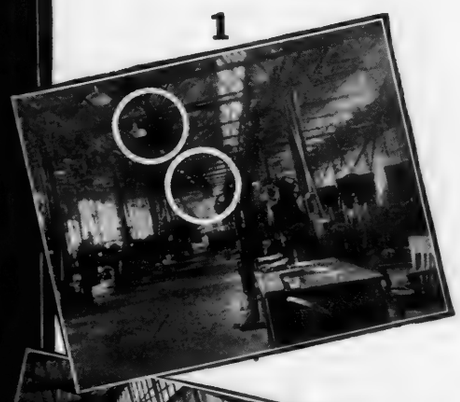
The Little Giant Hanger is made in sizes to fit any radiator and it cannot be seen after it is installed.

Distributed by United States Radiator Corporation
Sold by all leading jobbers

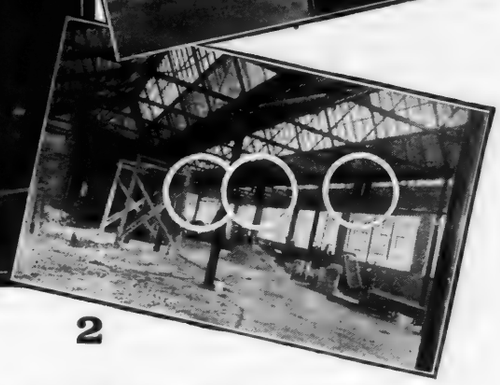
Little Giant
Manufacturing Co.

1927-31 Nicollet Ave. Minneapolis

Suspends from Steam Line

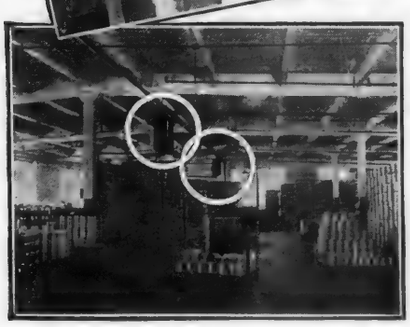


1 —*Factory; 9,000 square feet; 4 Modine Units.*



2 —*Machine Shop; 10,000 sq. feet; 5 Modine Units.*

3 —*Public Garage; 11,000 sq. feet; 3 Modine Units.*



4 — *Varnish Packing Room; 6,000 square feet; 2 Modine Units.*

Unparalleled Development of Industrial Heating

MODINE Unit Heater has brought to industrial plants an advanced method of heating that is unparalleled in its efficiency and simplicity. This new unit combines features that keep well apace with present day progress in the physical development of modern industrial plants.

The Modine Unit Heater replaces tons of dead weight with pounds of compactness as it weighs only 125 pounds.

Quickly installed without brackets, braces or structural work. Suspends from the steam line at any level desired. Two men and pipe wrench can do it in 30 minutes.

Air stream can be directed at any angle at will. 163,000 BTU per hour at 60 degrees temperature and 5 lbs. of steam pressure.

Write for Bulletin "A" which gives full details of this revolutionary type of heating.

MODINE MANUFACTURING COMPANY
HEATING DIVISION ThermModine RACINE, WISCONSIN
Chicago Sales Office, 720 Cass Street, Chicago, Ill.

MODINE
UNIT HEATER
FOR STEAM OR HOT WATER HEATING SYSTEMS

TWINFAN Unit Heaters

Keep Your Heat Where You Want It

No satisfactory reason has yet been advanced why a man should keep the temperature at the ceiling of his factory or garage 25 to 40 degrees warmer than at eye-level. His men don't work near the ceiling; they stand on the floor. Heat which rises to the ceiling is sheer waste.

When you use the direct radiation system, any attempt to keep floor temperatures fairly comfortable shoots the heating cost skyward. If you try to keep the cost down, your men get uncomfortably cold.

TwinFan Unit Heaters take you out of this dilemma. You can have plenty of heat at low cost. *TwinFans* suck the cold air off the floor, heat it and blow it to all parts of your building. There is little or no loss through overheating the ceiling.

TwinFans are year 'round units. Instant heat-control makes them invaluable during seasons of sudden temperature changes. They make first-class ventilating coolers in summer.

"Heat with Unit Heaters"

One sale of Dwyer TWINFAN Unit Heaters begets another. The satisfaction experienced by users of TWINFANS is a guarantee of a steadily increasing business. Let TWINFAN heating experts co-operate with you on your next heating job.

DWYER EQUIPMENT COMPANY
4534 W. NORTH AVE. CHICAGO, ILL.

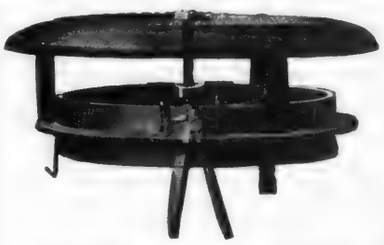
Sterlco
TRADE MARK

THE THERMOTROL

A self-contained temperature regulator which regulates room temperatures accurately, and is as easily installed as a radiator valve. Moderate first cost.

Write for Bulletin 38.

STERLING ENGINEERING COMPANY
1640 HOLTON ST., MILWAUKEE, WIS.



E-Z DAMPER GRIP-TITE Floor Vents

DAMPER FULLY ADJUSTABLE BY ONE BOLT WITH POSITIVE LOCK

ÆOLUS DICKINSON CO.
3336-44 So. Artesian Ave. CHICAGO
(Some territory open for agents)

GOLD HEATING & LIGHTING NEW YORK

AUTOMATIC
HEAT REGULATION
ELECTRICALLY OPERATED

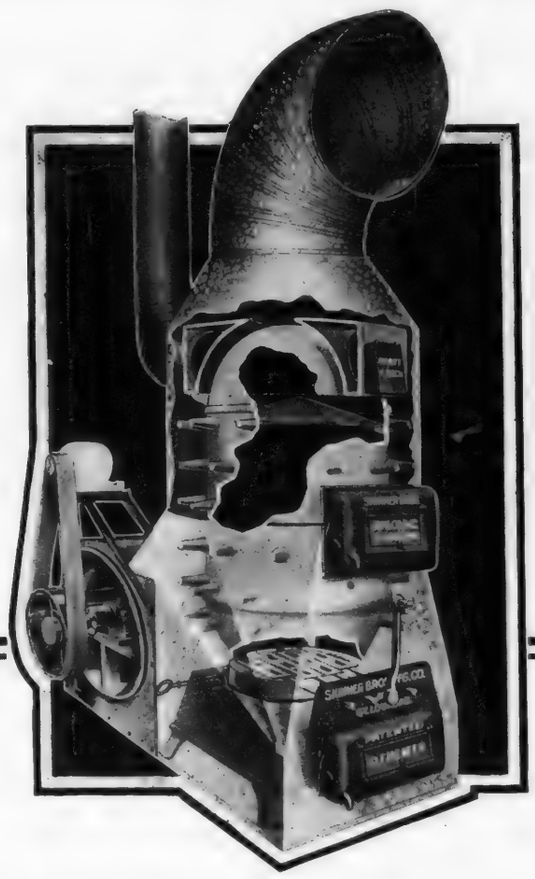
Packless Electric Valve

Whether it be for an isolated room or complete building, Gold's Control will give you that desired equable temperature. Energy derived from the 110 volt lighting current.

Write for General Catalog with Testimonials

Thermostat

GOLD CAR HEATING & LIGHTING CO.
BUSH TERMINAL
220 36th STREET BROOKLYN, N. Y.



Skinner Bros. Direct Fired Heater

For industrial plants without steam equipment

All the advantages of a unit heater without the use of a boiler

INSTALL Skinner Bros. Direct Fired Heater in industrial plants—the small garage and repair shop or the building covering a city block—in which steam is not available.

It will keep the building well heated and ventilated, maintain a constant, even temperature with no 'cold corners' in the building, and under ordinary conditions requires firing only three or four hours a day.

Portable, simple to install, quickly prepared for immediate operation and—

Gives More Heat—Uses Less Fuel

Its scientific construction assures that. A forced draft damper gives a wide range for intensifying fire. Its powerful multivane fan assures even temperature all over the room.

Any kind of fuel, coal, coke, wood, gas, or oil, may be used with a Skinner Bros. Direct Fired Heater. Equipped with oil burner and thermostatic control the heater is ideal.

Contractors use Skinner Bros. Direct Fired Heaters to prevent concrete and plastering from freezing in buildings under construction.

Write for catalog and evidence of superiority.

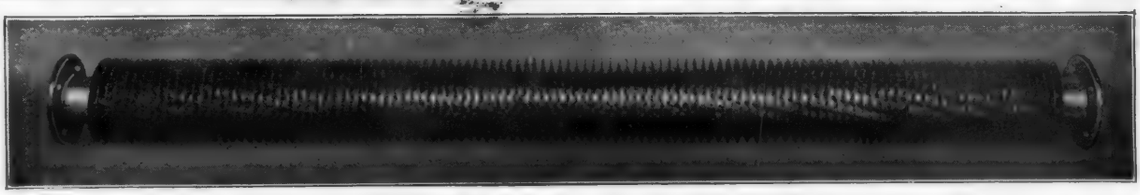
SKINNER BROS. MANUFACTURING CO., Inc.

Serving Industry for over a third of a century.

Home Office: 1404 S. Vandeventer Ave., St. Louis, Mo.
Eastern Office: 1014 Flatiron Building, New York City

Baltimore	Chicago	Detroit	Philadelphia	Seattle
Boston	Cleveland	Indianapolis	Pittsburgh	Spokane
Buffalo		Kansas City		Washington

Factories at St. Louis and Elizabeth, N. J.

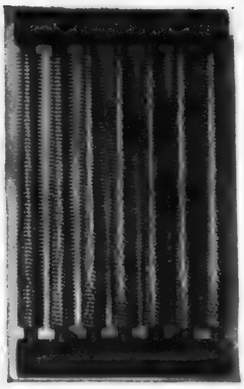


SCHUTTE KOERTING

RADIAFIN TUBES
for heating or cooling air

6 to 10 times as much surface as plain tubes of same size.

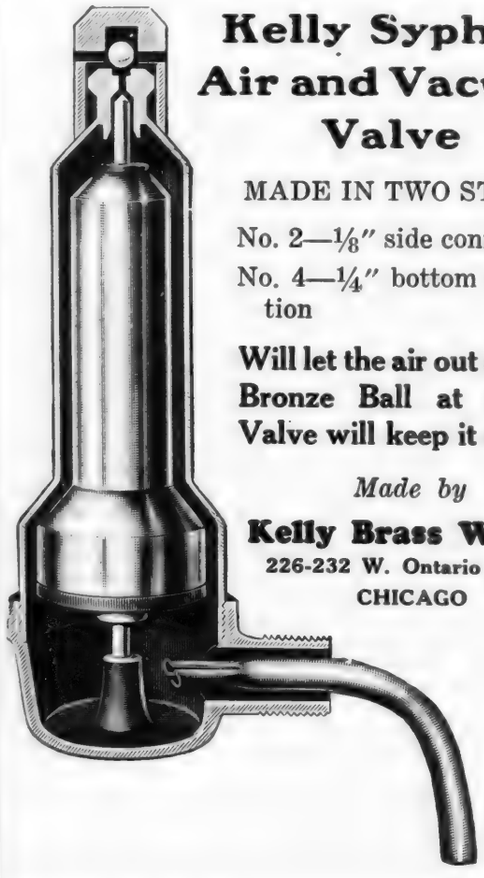
6 sizes, ¾ in. to 3 in., lengths up to 15 ft., plain or flanged ends, with or without headers.



The radial fins insure maximum heat transfer.

For further information address our Heat Transfer Department.

SCHUTTE & KOERTING CO., 1153 Thompson St., PHILADELPHIA, PA.



Kelly Syphon Air and Vacuum Valve

MADE IN TWO STYLES

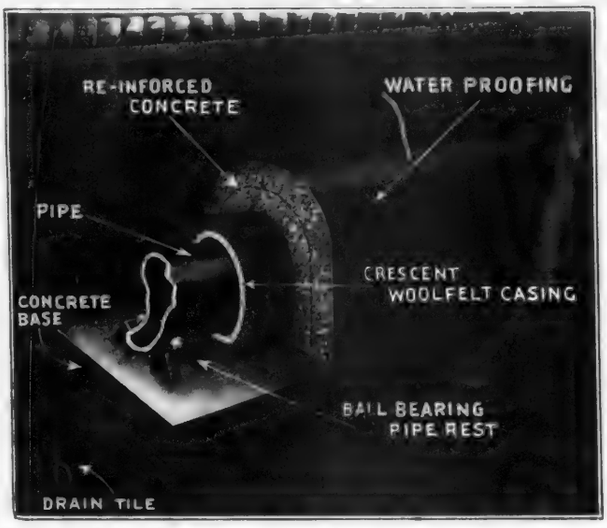
No. 2—⅛" side connection

No. 4—¼" bottom connection

Will let the air out and the Bronze Ball at top of Valve will keep it out.

Made by

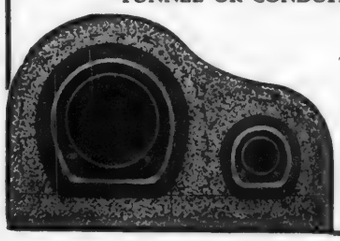
Kelly Brass Works
226-232 W. Ontario Street,
CHICAGO



THE CRESCENT SYSTEM

Dirt-Proof Ball Bearings, and Air Space Around Pipe, Permits Rotation of the Pipe, Adding Years to its Life.

Manufacturers and Contractors of
UNDERGROUND STEAM DISTRIBUTING SYSTEMS
TUNNEL OR CONDUIT CONSTRUCTION



"We solicit your correspondence"

W. H. PEARCE & CO.
115 S. Dearborn Street
CHICAGO

Catalog on Request

Buckeye Thermovent Units

Installation of Type E Thermovent, Showing Sheet-Metal Ducts for Air Distribution

Putting the Warm Air Where It Belongs

Instead of letting the heated air pile up at the ceiling and accumulate at a high temperature in order to heat the lower level of a room comfortably, the THERMOVENT blows its heated air downward with sufficient force to reach the floor, thereby heating the part of the room that is occupied, which is where the warm air belongs. This even distribution of the warm air obviates necessity of excessive heating to overcome the cold spots.

Being a ceiling mounted unit, its position is not only advantageous from a standpoint of efficient air diffusion, but is economical in the saving of valuable floor or wall space. Extremely compact and quiet in operation, and successfully disposes of many otherwise bothersome problems of heating and ventilating installations. THERMOVENT is particularly suited for heating and ventilating factories, garages and other industrial buildings as well as churches, theatres, auditoriums, gymnasiums and similar assembly rooms.

Send for our catalog fully describing the THERMOVENT UNIT and its advantages.

A Few of the Advantages

Low first Cost

Can be installed at from twenty to forty percent lower than direct radiation system because Thermovent eliminates the cost of valves, piping, traps, radiators, etc. Where ventilation is desired, it replaces system of direct radiation and large ventilating fans.

Ease of Installation

Easily installed, as it is shipped completely assembled ready for mounting. When in position only steam and electrical connections are necessary.

Small Space Required

Thermovent heights vary from 18" to 34" and depths from 38" to 55", and widths from 40" to 60", depending on requirements. Regularly designed for ceiling suspension, saving valuable floor space. Can be furnished for floor or other mountings.

Economical Operating Expense and Maintenance

Costs less to operate than direct radiation because all of the heat is utilized. Can be operated by manual or automatic control, giving intermittent or continuous service. Only two points in Thermovent require attention; namely, two motor bearings readily accessible for occasional oiling.

Effective Air Distribution and Diffusion

Has sufficient velocity to thoroughly diffuse the air and distribute it without objectionable drafts. Actual tests have shown maximum variation between floor and ceiling temperatures of average room less than ten percent.

Ease of Control

Motor can be started and stopped at will, manually or automatically. Some types provided with both by-pass and mixing dampers, manual or automatic control, permitting regulation and maintenance of room temperatures.

THE BUCKEYE BLOWER CO.

Columbus, Ohio

BRANCH OFFICES:

216 Bona Allen Bldg., Atlanta, Ga.
2126 Edmondson Ave., Baltimore, Md.
2017 Fourth Ave., North, Birmingham, Ala.
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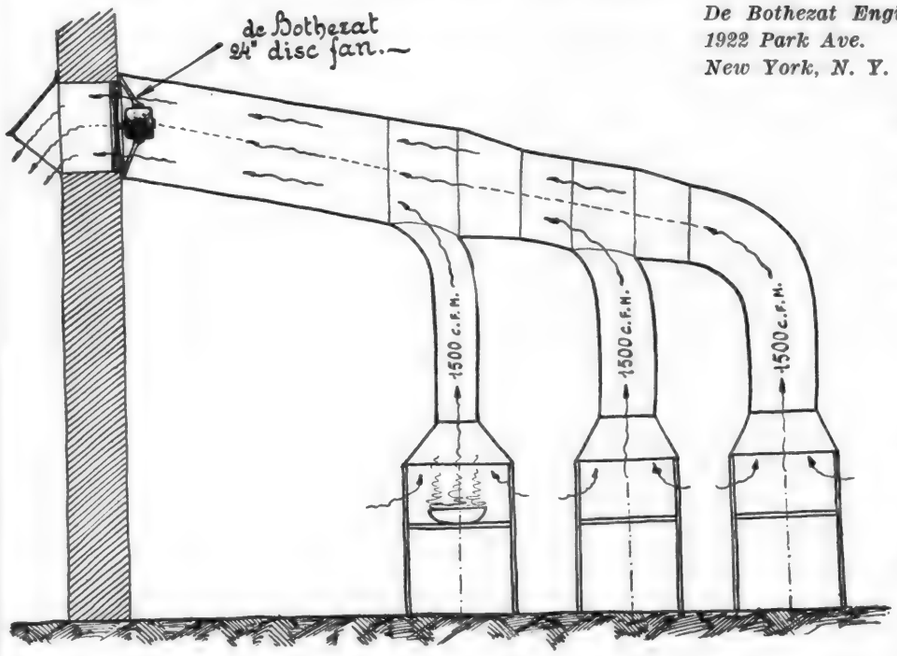
301 Rose Building, Cleveland, Ohio.
401 Transportation Building, Chicago, Ill.
3115 No. Central Ave., Indianapolis, Ind.
1226 California St., Denver, Colo.
400 Penobscot Bldg., Detroit, Mich.
1400 Broadway, New York, N. Y.
1011 Pioneer Trust Co. Bldg., Kansas City, Mo.
821 Bulletin Building, Philadelphia, Pa.
709 Columbia Bank Bldg., Pittsburgh, Pa.
210 Dooly Bldg., Salt Lake City, Utah.
Fales Building, Seattle, Wash.
226 Kirk Ave., Syracuse, N. Y.
1101 Realty Building, Youngstown, Ohio.

Read what Mr. Kuhrt has to say about
De Bothezat Disc Pressure Fans



Installation at the Premier Metal-Etching Company, L. I. C., New York.

De Bothezat Engineering Corp.
1922 Park Ave.
New York, N. Y.

Dec. 11th, 1925.

Dear Sirs:

We take pleasure in informing you that the disc fan that you installed for use with our three spray booths, is doing all that you claimed it would do. We are very well satisfied with the results.

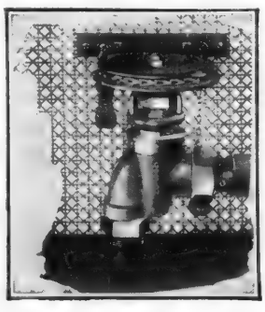
Very truly yours,
PREMIER METAL ETCHING CO.
(Signed) O. C. Kuhrt.

And, as an endorsement of this letter, they ordered several more De Bothezat Disc Pressure Fans.

De Bothezat Disc Pressure Fans will develop the necessary static Pressure to overcome duct resistance.

Write for catalogue H.V.

De Bothezat Impeller Co.
Incorporated
1922 Park Ave., New York City



Behind the Grille

Front View

The
GORTON
CHAIN PULL
VALVE

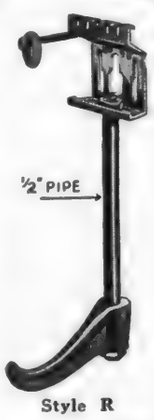
Insures
Convenient Control of Radiators
Enclosed or Overhead
On any Heating System

We will be pleased to send full particulars on request.

Gorton & Lidgerwood Co.
96 Liberty Street, New York, N. Y.
Established 1887 Representatives in Principal Cities

E Z
RADIATOR HANGER

WE couldn't afford to say E-Z Radiator Hangers are adapted to any ordinary wall construction unless we KNOW! Two-by-four studding has all the strength needed to hold the pull on the anchor bolt.



Style R

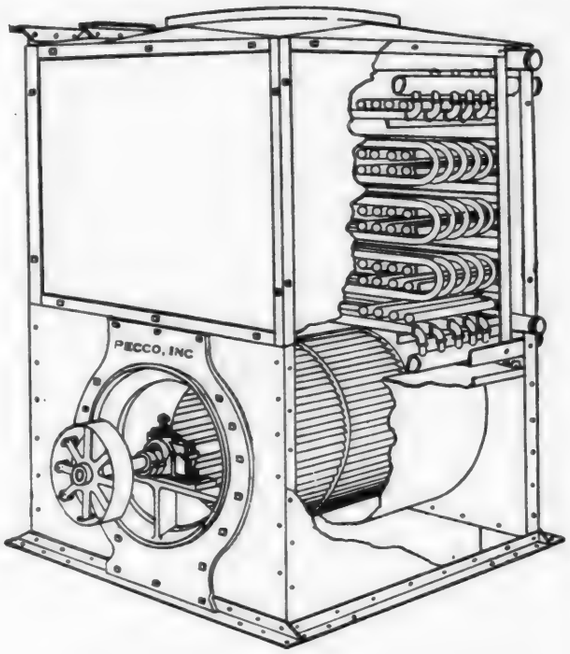
HEALY-RUFF CO.
772 Hampden Avenue
ST. PAUL, MINN.

"A big help to Customers"

"They Keep the Whole Place Warm"

The Interior Construction of Pecco Unit Heaters

In this illustration the single sheet steel casing of a Pecco Unit Heater is cut away to show the arrangement of the various parts used in its construction. The pulley and shaft, operating on self-aligning ball bearings, are seen projecting through the intake port. The fan wheel is located directly under the assembly of interlocking steam coils. The scroll bottom, which assures stream-line air distribution, is visible below the fan. Simple, sturdy and efficient in design, Pecco Heaters operate for long periods without attention.



Following Natural Laws of Ventilation

The effectiveness of Pecco Heaters can be attributed to the thoroughness with which they follow the fundamental natural laws of aerodynamics. Cold air always settles near the floor level, therefore the intake port is located at this point. Warm air rises to the ceiling and for this reason Pecco engineers have placed the outlet hood in this warm air area.

Appreciating the futility of merely warming the air without providing a method of distributing it, the designers of Pecco Heaters have assured a constant recirculation of air by installing a powerful fan wheel.

Blades are pitched so as to produce smooth delivery of a maximum volume of air at slow speed. This reduces the power requirements and provides economy of operation.

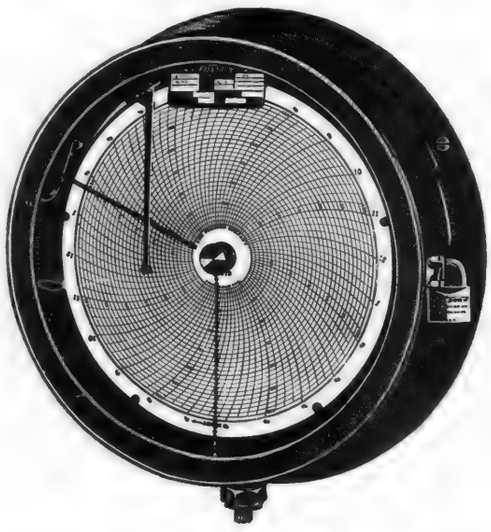
Pecco, Inc. offers a complete consultation service to everyone interested in heating, ventilating, drying and hydrating. Many typical Pecco installations are illustrated and fully described in the new catalog, which will gladly be sent on request.

PECCO, INCORPORATED, 2980 North Market St., St. Louis, Mo.

PECCO UNIT HEATERS

"They Keep The Whole Place Warm"

Heat with Unit Heaters



Save One Man's Time—More Accurate Results

A large Pennsylvania steam heating company had always employed one man exclusively while testing condensation meters on all consumer lines. Several Foxboro Flow Meters now do this work. Tests are much more accurate. Also, these Foxboro Meters save one man's time at 50 cents an hour.

This company realizes that no engineer or production manager can improve conditions in his plant until he knows what they are. Foxboro Instruments show exactly what conditions are every minute of the day and night.

The use of these accurate, dependable instruments will enable you to increase production and to save men, money and materials.

What is your problem? Write or wire. Your case will be given individual attention.

THE FOXBORO CO., Inc.

Neponset Ave., Foxboro, Mass., U.S.A.

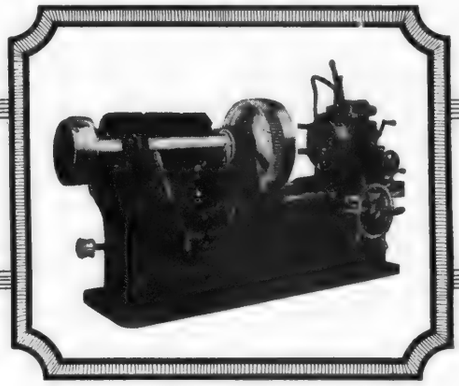
New York Chicago Boston Philadelphia Pittsburgh
Cleveland Rochester Tulsa Atlanta
Los Angeles San Francisco Portland, Ore.

FOXBORO

REG. U. S. PAT. OFF.

THE COMPASS OF INDUSTRY

STANDARD WIELAND PIPE THREADER AND CUTTER



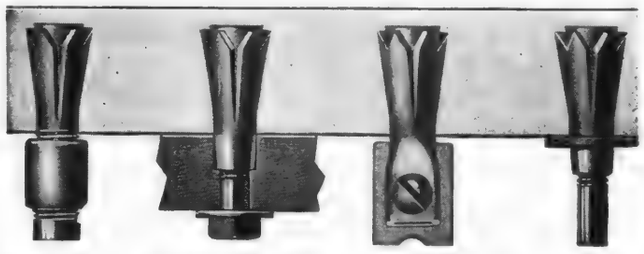
No complicated parts to confuse the operator or to become out of order.

Wide chasers insure extra long threads at one cut.

All gear speed changes permit the use of single speed pulleys or constant speed motors

Write for descriptive bulletin.

STANDARD ENGINEERING COMPANY
ELLWOOD CITY, PENNA.



Phillips Self-drilling Expansion Shells

For fastening all types of hangers to concrete ceilings, side-beams, columns and walls, and for bolting timbers and other equipment to concrete and stone.

Installing Self-drilling Shells in Concrete

Every shell is a drill and makes its own hole, thus eliminating drill trouble and expense.

A new sharp drill for every hole and a smaller hole per given size bolt reduces labor cost of installing to absolute minimum.

A perfect fitting hole and the enlargement of shell and hole at extreme bottom insures reliability and better workmanship.

Quickly installed with the Phillips Spring Hammer, or with special hand chucks.

Ceiling with Phillips Spring Hammer Drill

Manufactured by

PHILLIPS DRILL COMPANY

1537 Cortland Street CHICAGO, ILL.

An Open Letter to ARCHITECTS and ENGINEERS

GENTLEMEN:

HERE'S REAL NEWS. Geo. F. Gebhart, ME., in the laboratory of Armour Institute of Technology, Chicago, Illinois, and Professor L. S. O'Bannon in the College of Engineering of the University of Kentucky, Lexington, have conducted extensive tests on the Type ME Fan and have issued certified performance sheets covering every phase of efficiency, capacity, pressure, etc., together with characteristic curves.

The above were selected to make these tests for three reasons:

(1) The New York Blower Company conducted its own performance tests and obtained results so favorable, that to avoid any suggestion of exaggeration or appearance of self-serving declarations, called upon disinterested and competent authorities to give an unbiased report. In other words to have the rating of the ME Fan certified.

(2) Engineers supervising tests are experienced men nationally known for their probity, skill and experience in experimental and research work of this nature.

(3) The equipment in these laboratories is modern, insuring accurate results.

Architects and engineers will be interested to know, as a result of these findings, that the ME Fan in mechanical efficiency and performance is unsurpassed.

A limited number of portfolios have been compiled showing the complete tests in all details together with photographs of the apparatus used. A portfolio will be submitted to those desiring to study the fan tests thoroughly.

In addition to its certified performance, there are other features of the ME Fan that will commend it, such as appearance, quality and durability.

Catalog No. 100, a 32-page book describing fully the ME Fan and containing complete capacity sheets, will be gladly sent to anyone upon request.

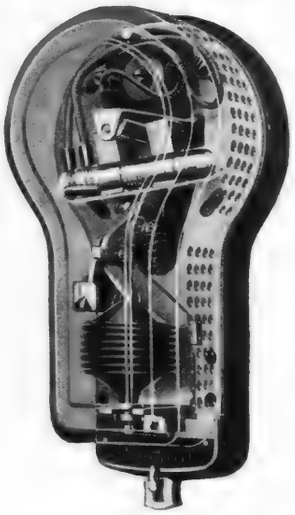
Yours very truly,

NEW YORK BLOWER COMPANY

2242 South Halsted Street

CHICAGO

One of the Family



Mercoid Thermostat

THIS MERCOID THERMOSTAT is one of the large family of Mercoid Controls for automatic heating equipment. The entire line is completely illustrated in special bulletins we have issued and in advertisements appearing in our popular house organ.

THE FEDERAL GAUGE COMPANY
564 W. Adams St., Chicago · New York Office: 25 Church St.

An Interesting Publication FOR YOU!

"Mercoids" is issued monthly and sent without cost to those on our mailing list. It contains many splendid articles written especially for us by leaders in the oil burning industry, and has been frequently quoted in national publications. Fill in the coupon below and we will be glad to place your name on the mailing list to receive it regularly.

Mail This Coupon

The Federal Gauge Company
564 W. Adams Street, Chicago

Please put my name on your mailing list to receive regularly your monthly publication "MERCOIDS."

Name _____

Firm _____

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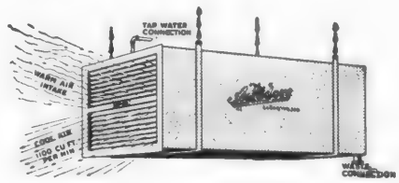
COOL!

The Aerodore
GAMES SLAYTER SYSTEM



The Aerodore cools, washes out dust, and odors, controls humidity.

Any home, office or kitchen can be kept below 80° in the hottest weather.

Simple in construction, operated entirely by city water, no electrical or other connections necessary.

Write today for descriptive folder.

Announcing "Slayter Unit Heat"

A combined Oil Burner, Warm Air Furnace, Unit, which has been under development for five years. (Inquiries solicited.)

Games Slayter

Industries

Lafayette Ind.

Another Notable Ilg Unit Heater Installation *the Champion Coated Paper Co.*

Very Satisfactory

Says Vice President W. D. Randall

"IN our new coating mill finishing room extension, which is some 255 feet x 600 feet, we depend entirely for heating on the ILG Unit Heaters, and although the single story, sawtooth roof with a great expanse of glass would make a rather severe condition to heat satisfactorily during the cold weather experienced last winter, the ILG Heaters have taken care of the situation in such manner that on the coldest days this large room has always been heated to a comfortable temperature." — *W. D. Randall, Vice-President, Champion Coated Paper Company.*

The heating equipment used in the building mentioned above and in various other buildings at the Champion Plant is:

24 ILGAIR Unit Heaters, Size 10003
6 ILGAIR Unit Heaters, Size 5003
1 ILGAIR Unit Heater, Size 7003
2 ILGAIR Unit Heaters, Size 3003
1 ILGAIR Unit Heater, Size 2003

Write for new Illustrated Bulletin regarding Ilgair Unit Heaters.

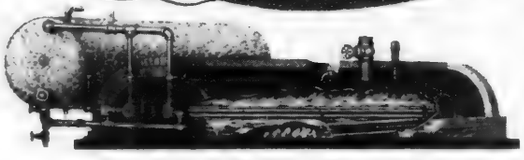
HIGH EFFICIENCY TRADE ILG MARK VENTILATING MACHINE

Unit Heaters

"Heat with Unit Heaters"

ILG ELECTRIC VENTILATING CO.
2858 NORTH CRAWFORD AVE. CHICAGO ILL.

Hot Water at Half the Cost



Let Us Tell You How

IT is easy to understand why hotel, hospital, office and apartment building owners are asking their heating and plumbing contractors to install this improved method of heating water. Over one quarter of a million people are supplied with hot water, day and night, winter and summer by UNITEM Submerged Water Heaters.

UNITEM can and does provide an abundance of hot water no matter how much is demanded of it, and all by merely using the surplus heat in the steam boiler to supply hot water to every faucet in the building.

Made in sizes to fit any boiler, UNITEM can be installed in oil fired boilers as well as in coal burners, operating in summer and winter with equal satisfaction.

We cooperate with architects, contractors, and owners in making surveys, estimates and insuring a satisfactory installation.

Sold only through the trade.

Mail the Coupon today for our illustrated Catalog, "Heating Water With Water".

BELL & GOSSETT COMPANY
3000 Wallace Street, Chicago, Illinois

Cleveland, Ohio
2281 Scranton Road.

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McDermott Water Heaters, Inc.
101 Park Ave., New York City.

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BELL & GOSSETT CO.,
3000 Wallace Street, Chicago, Ill.

Gentlemen:

Kindly send us your illustrated Booklet, "Heating Water with Water".

Name .....

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SUBMERGED WATER HEATER

Second National Exposition

EXCLUSIVELY

Heating and Ventilating

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The only National separate and distinct Exposition for these industries

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RESERVE YOUR SPACE NOW

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NEW HOME of the

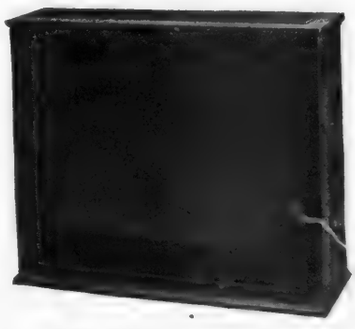
Universal Heating and Ventilating Unit

Located at

STATE ROAD AND RHAWN STREET, HOLMESBURG JUNCTION, PHILADELPHIA

This new building is the largest plant devoted exclusively to the manufacture of heating and ventilating units.

Nation-wide sales and service through offices of the American Blower Company in all principal cities.



The Universal Unit
The Standard by which all other makes are measured
REG. U. S. PAT. OFFICE

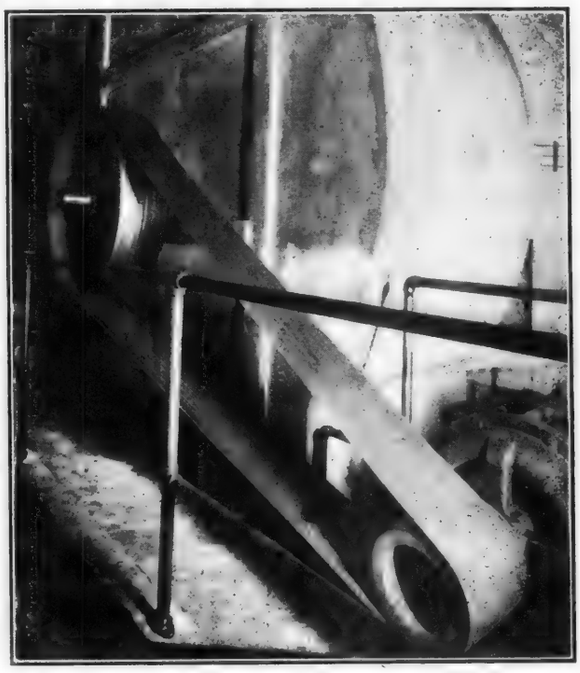
JOHN J. NESBITT, INC.

STATE ROAD AND RHAWN STREET

HOLMESBURG JUNCTION, PHILADELPHIA

A Typical "Tentacular" Drive on a Large Fan

Motor 40 H.P. **Motor Pulley 13" x 13"**
745 R.P.M. **Fan Pulley 48" x 12"**
Centers 9 ft. **Actual Fan Speed 200 R.P.M.**

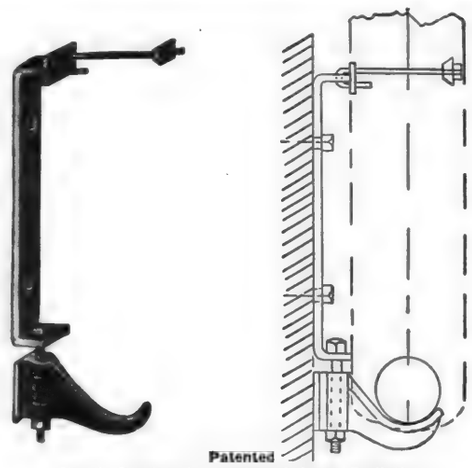


This Tentacular belt, 12" wide *Single Ply Leather*, was installed by the Carrier Engineering Corp. in November, 1924. It has been in continuous operation 24 hours a day ever since, showing less than 1% slip at all times.

Previous belts, 12" *double ply leather* and other heavy materials gave considerable trouble on account of excess stretch and slippage (15% and more). No special pulleys required. Roller Pulleys eliminated.

Send for Tentacular Booklet, fully descriptive, or better still, give us the data on a drive that interests you for our guaranteed recommendation.

ALEXANDER BROS., Inc., 16 South Street, Philadelphia



Patented
No. 9 Bracket for Legless Column Radiation

GLEOCKLE fits them all

It is not necessary to know the make of wall radiator to be used. Just specify Gleockle Adjustable Wall Radiator Brackets and your bracket requirements will be filled. They are made to fit any make of wall radiator, and besides being convenient, they are safe, durable, inexpensive and invisible after erection.

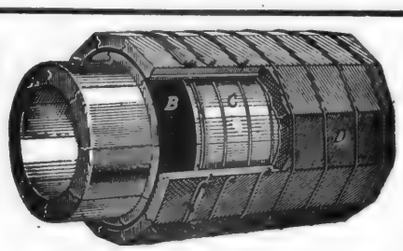
Send for descriptive booklet and trade discount

FIT ANY MAKE OF RADIATOR

A. F. GLEOCKLE, Jr.

415 Bay Street ROCHESTER, N. Y.

Wyckoff's Improved Cypress Covering



Lasts as Long as The Pipe Itself

As well as being highly efficient in its application, Wyckoff Improved Cypress Steam Pipe Covering withstands all conditions attending steam pipe trenches. All engineers who know Wyckoff Pipe covering specify it because it lasts.

A. WYCKOFF & SON CO. ELMIRA, N. Y.

FREE

For Heating and Ventilating Engineers!

Write for YOUR copy

Gives complete information, including prices, in a handy condensed form. Every heating and ventilating engineer who wants the BEST regulating devices that can be obtained should have a copy. Reducing Valves, Damper Regulators, Temperature Regulators, Float Valves, Etc.

ATLAS VALVE COMPANY
REGULATING VALVES FOR EVERY SERVICE
281 South St., Newark, N. J.

Front view of Unit showing radiator.

Rear view of Unit showing motor and fan.

For heating Garages, Factories, and other Industrial Buildings—

Modern UNIT heaters are easier to install than cast iron radiation, less expensive, and far more satisfactory in operation. They provide easier control of room temperature, quicker heating, and more uniform distribution of heat —without any extra drain on the boiler. Special provision for ventilation can be included, as well as automatic temperature control by means of a thermostat, as extra equipment.

Peerless Industrial Heating Units are built by the *pioneers in unit ventilation*, in the same plant that turns out the well-known PeerVent Unit System of Heating and Ventilating. Heating-ventilating units built by this Company *twelve years ago* are still giving trouble-free service year after year.

Write for literature. If you wish we will gladly send our local sales representative.

Heat With Unit Heaters

PEERLESS UNIT VENTILATION CO., INC.

Skillman Avenue and Hulst Street, Long Island City, N. Y.

CHICAGO 808 Monadnock Bldg.	PITTSBURGH 301 House Building	DES MOINES 520 Securities Bldg.	BOSTON 100 Boylston St.	PORTLAND, ORE. 927 Board of Trade Bldg.
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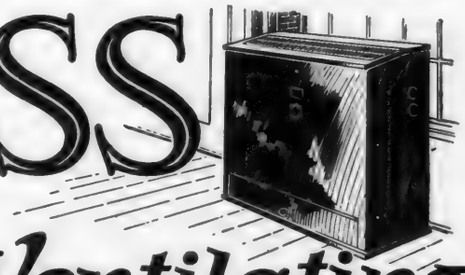
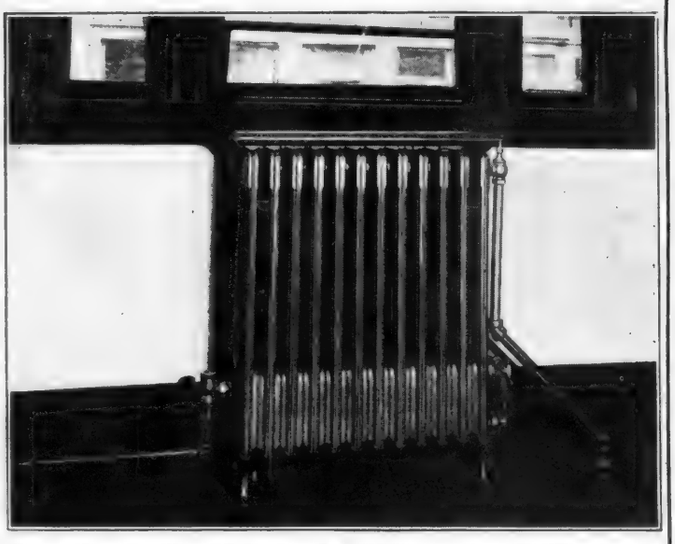
PEERLESS



UNIT SYSTEM

Heating and Ventilating

EACH RADIATOR AN INDEPENDENT STEAM HEATING PLANT



Clow Combination "Gasteam" Radiators are ideal for such offices as this

Convenient Heat For Every Room

The convenience and economy of a heating system that can vary with the ups and downs of changing seasons—one that can provide the right heat when and where it is needed—one that permits of starting the boiler a month or two later in the fall and shutting it down a month or two earlier in the spring—is easily apparent.

Combination Heating offers just such advantages.

Clow "Gasteam" Radiators are a part of the standard heating system. When the boiler is in operation they function as any other radiator. When the heating plant is closed down Gasteam Radiators produce their own steam.

On cool days or nights—in spring or fall—it is a simple matter to heat any room in the home or office. Just turn the valves, strike a match, and light the Clow Radiators that you need.

Clow Gasteam and Gaswater Radiators are furnished for all standard steam and hot water systems.

JAMES B. CLOW & SONS

201-299 N. Talman Ave., Chicago

Offices in Principal Cities

CLOW

GASTEAM — GASWATER

Keep the Same Temperature Summer and Winter with BRISTOL'S

TRADE MARK REG. U.S. PAT. OFFICE

Weather conditions outside will have less effect on indoor temperatures if Bristol's Recording Instruments are used to guide in the regulation of heating and ventilating systems. Simple and rugged in construction, they enable the engineer to keep his equipment under control at all times.

Our sales engineers may be able to help in the selection of the correct instruments for your needs.

Write for further information.

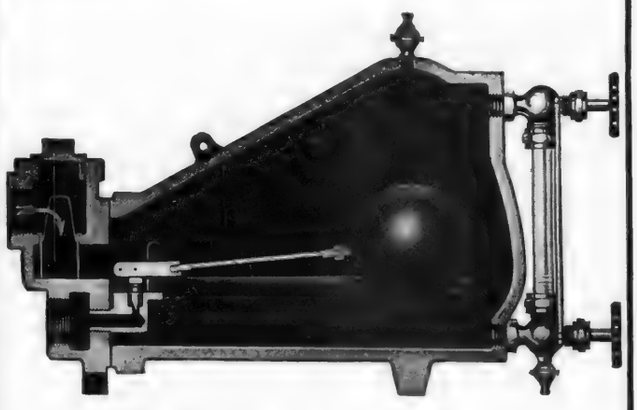
The Bristol Company *Waterbury, Connecticut*

FOR 36 YEARS — Ask Any Technical Engineer — MAKERS OF

BRISTOL'S RECORDING INSTRUMENTS

Quality KIELEY Simplicity

REGISTERED TRADE MARK



The Kieley Ball Float Trap for High or Low Pressure. ❦ Suitable for Laundry Machines and Stack Heaters. ❦ Large Capacity and Simple in Construction.

KIELEY & MUELLER, Inc.

34 West 13th St., New York City

MIDWEST - - THE LEADING AIR FILTER IN NEW YORK

MOST buildings in New York that have air filters are equipped with Midwest installations, and practically every mechanically ventilated building now being constructed in this city will be supplied with clean air through Midwest Air Filters.

In addition to the buildings shown above we might mention the following—either in the course of construction, or recently completed.

Drake Hotel
R. Candela, *Architect*

Keith's 86th St. Theatre
Thos. W. Lamb, *Architect*

New York University
W. S. Gregory, *Architect*

Madison Square Garden
Thos. W. Lamb, *Architect*

Great Northern Building
G. E. Marshall, *Architect*

The Manger Apt. Hotel
H. Craig Severance, *Architect*

Schrafft's 5th Ave. Building
C. E. Birge, *Architect*

Ziegfeld Theatre
Thos. W. Lamb, *Architect*

Royal Insurance Building
Starrett & Van Vleck, *Architects*

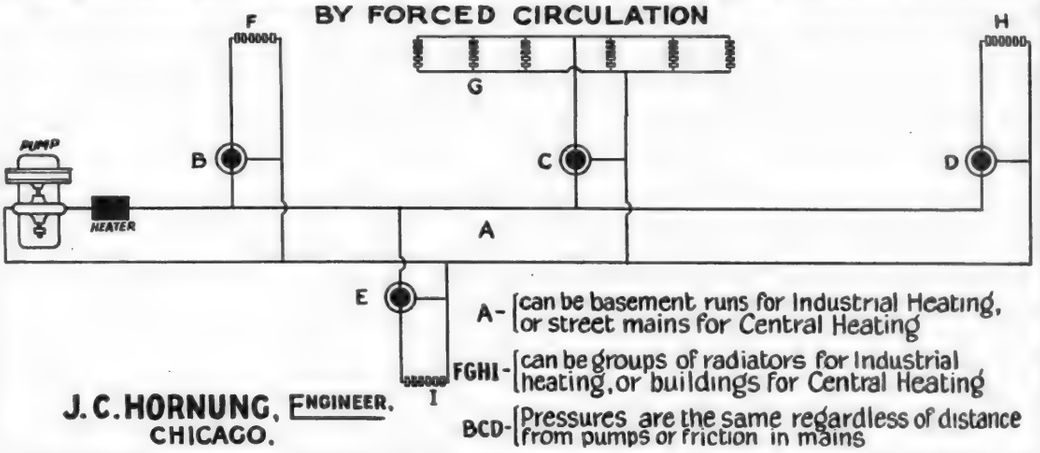
New Delmonico Building H. Craig Severance, *Architect*

Ask Dept. H for Certified Performance Reports which show why "You're certain when you specify Midwest Air Filters"

MIDWEST AIR FILTERS
INCORPORATED
BRADFORD PENNSYLVANIA

THE HORNUNG DIFFERENTIAL SYSTEM OF HOT WATER HEATING

BY FORCED CIRCULATION



J. C. HORNUNG, ENGINEER, CHICAGO.

Central station and industrial hot water heating by forced circulation have enough good qualities to keep them both in a lively existence.

Like all other public utilities supplying continuous service, some means of automatic regulation is essential in order that waste, so prevalent everywhere, may be reduced to a minimum.

Let us tell you about some of the largest plants in the world that eliminate waste automatically with Central Heat Appliances.

CENTRAL HEAT APPLIANCES
J. C. Hornung, Engineer
343 S. Dearborn Street, Chicago, Ill.
(3777)

Thin layers of water surrounded by fire

THIS SECTIONAL CUT will show anyone, at a glance *why a*

THATCHER Round Boiler

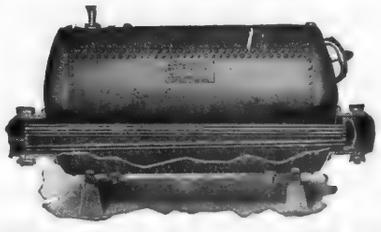
means both quick and economical heat.

He will see just how the thin layers of water are in direct contact with surfaces kept hot by the flames, smoke and gases from the furnace fire.

Send for full information regarding THATCHER Round Boiler and our other Thatcher Products.

The Thatcher Company
Since 1850
39-41 St. Francis St.
NEWARK, N. J.
341 N. Clark St. Chicago — 21 W. 44th St. New York

THATCHER
BOILERS-FURNACES-RANGES

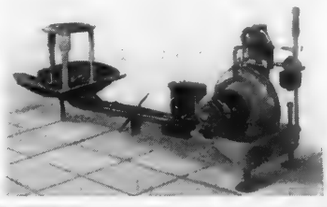


Alberger-Buffalo Storage Heaters have tubes the full length of tank which insures maximum heat transfer. Satisfaction guaranteed. Write for information on Alberger Multi Head Heaters and Howard Guided Expansion Joints.

ALBERGER HEATER COMPANY
HOWARD IRON WORKS
281-289 Chicago St. Buffalo, N. Y.

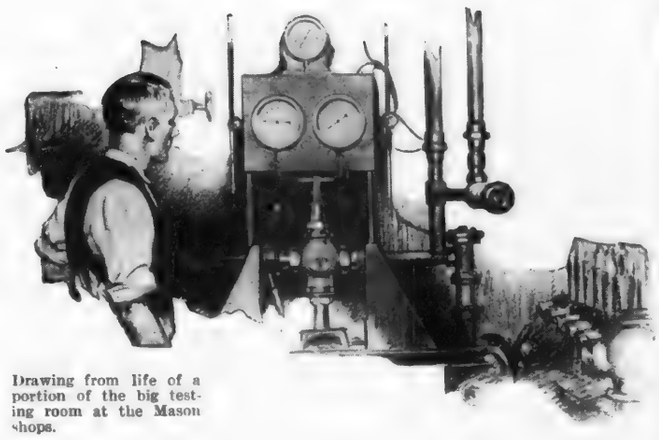
The CHALMERS OIL BURNER

was among the pioneers in the oil burner industry and their present popularity is based on the permanent, satisfactory service they have delivered through the years.



Approved by Underwriters Laboratories. Responsible Representatives will find the Chalmers Agency a profitable one.

CHALMERS OIL BURNER CO.
Minneapolis, Minn.
Member American Oil Burner Association.



Drawing from life of a portion of the big testing room at the Mason shops.

If Jim Says They're Right They Are Right

Not an occasional "one out of fifty" but *every* Mason Regulator must pass a series of exacting tests for accuracy and dependability under the eagle eye of Jim, the Mason testing engineer.

No matter what the type or size of pressure regulator, you may be sure when you specify *Mason* that its ability to meet the most exacting conditions of service it will be put to in your plant has been thoroughly test-proved.

That's one reason why so many engineers have standardized on Mason Regulators throughout.

Our staff of experienced pressure control engineers is at your service. May we send you Catalog, installation blue prints or other information?

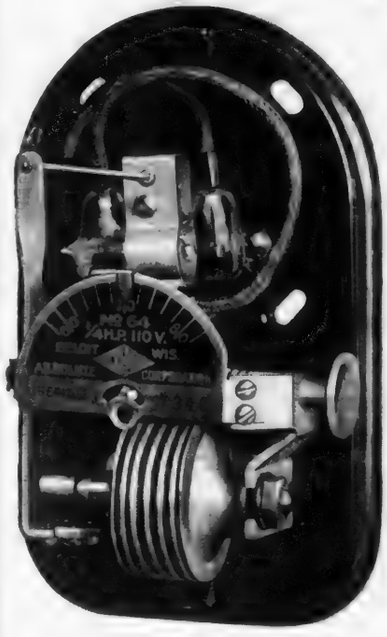
Mason test-proved regulators include:

Reducing Valves
Pump Pressure Regulators
Boiler Feed Line Regulators
Damper Regulators
Fan Engine Regulators
Pump Speed Governors
Vacuum Regulators
Balanced Valves
Strainers

354

Mason Regulators
MASON REGULATOR CO.
Boston, Mass.

CON-TAC-TOR THERMO-SWITCH



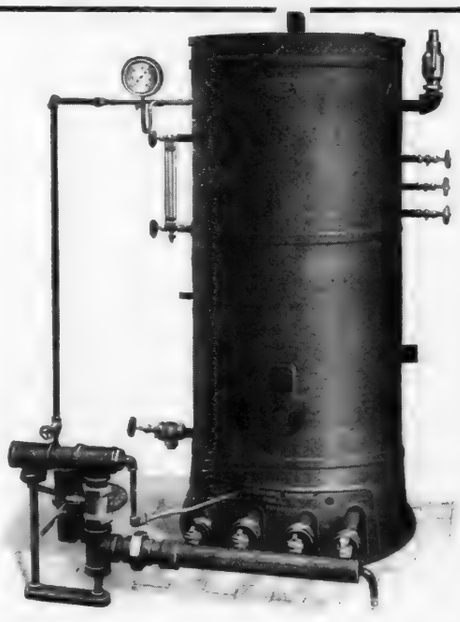
Practical
Simple
Safe

High Voltage—Switches Motor without Relay.

For
Oil Burners
Unit Heaters
Forced Draft
Coal Burners
Etc.

A complete line of Automatic High Voltage Controls listed in Bulletin HO-7

ABSOLUTE CON-TAC-TOR CORPORATION
ELKHART, INDIANA



KANE **Gas Fired Automatic Steam Boiler**
Highest Efficiency

The first KANE Gas Fired Steam Boiler was manufactured over twenty five years ago and since that time over 5600 have been installed in this and other countries.

KANE boilers are rendering efficient and valuable service to their satisfied owners and can be identified with every branch of industry where steam, at high or low pressure is required for industrial or domestic purposes. *Send for descriptive literature.*

Monarch Sales & Engineering Co.
363 W. Erie St., Chicago, Ill.
2010 Locust Street St. Louis, Mo.
Southern Industrial Engr. Co. American Trust Bldg., Birmingham, Ala.

ACE

AIR FILTERS

During last month we had requests for information regarding Pure Air Practice from

8 Automobile manufacturers
7 Food Product manufacturers
4 Cereal manufacturers

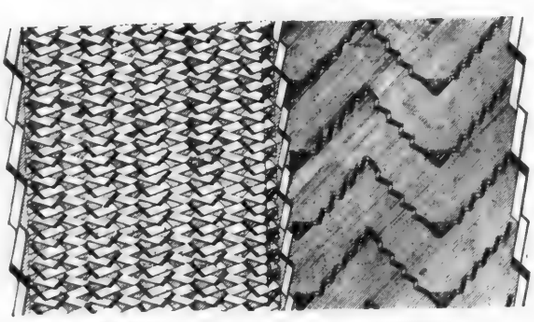
The information wanted covered the use of Ace Air Filters in Air Compressing, Sand Blasting, Painting, Spraying, Japanning and other special manufacturing uses.

Every manufacturer needing clean, pure air must take account of the

Ace Guarantee

We guarantee that the Ace Filter has the highest cleaning efficiency with the lowest average resistance of any Air Filter known, regardless of type.

THE SERVICES OF THE ACE LABORATORY AND ENGINEERS ARE AT THE DISPOSAL OF ANY COMPANY DESIRING TO PROVE THE ACCURACY OF THE ACE GUARANTEE CITED ABOVE.



2nd Stage 1st Stage
Air Flows from Right to Left

Write us about your pure air problems—if you have any.

GENERAL AIR FILTERS CORPORATION
Manufacturers of
AIR PURIFICATION EQUIPMENT
110 W. 42nd STREET NEW YORK

"No Radiation is Needed to Heat this Factory"

WHEN the question of *plant heating* is being considered, before you contract for an elaborate steam or hot water system with its costly radiation, investigate the Mueller Direct-Fired Forced Air Unit.

Engineers and plant owners find that this forced air unit heater not only gives more satisfactory heating and ventilating service, but is also far more economical in first cost and maintenance. It requires no radiation. Burns low grade fuel. No danger of freezing, breakages or shut-downs. You don't need a licensed engineer to run it.

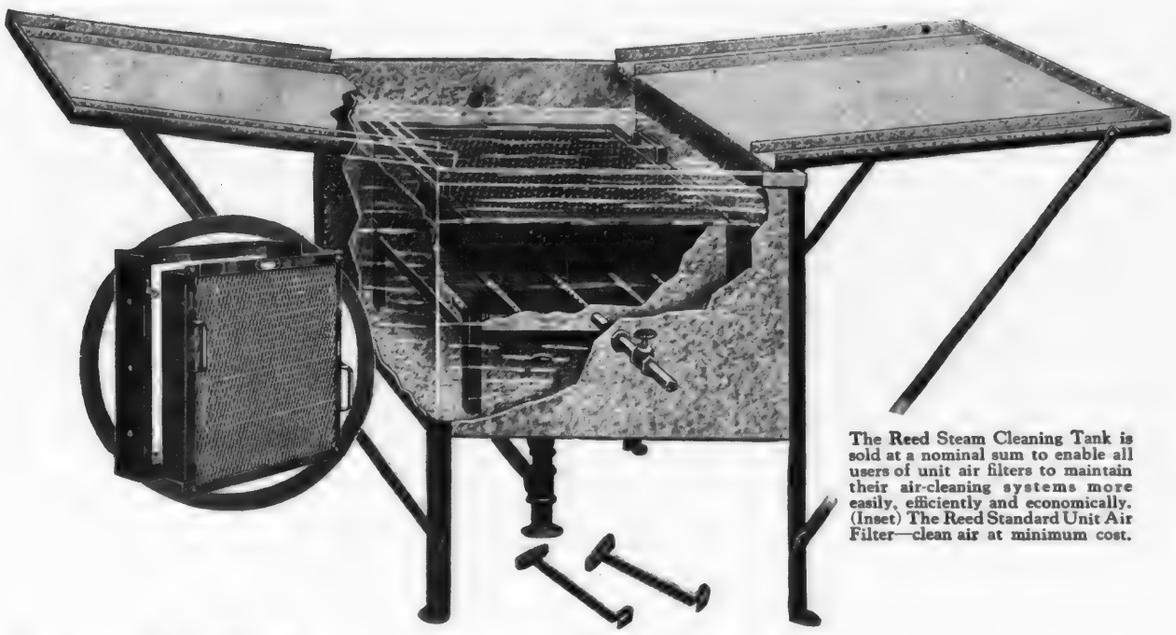
The Mueller Unit provides a positive circulating system for peak loads and quick heating periods and a gravity system for night operation or when building is unoccupied. It may be operated singly, in independent units, or in batteries, to obtain satisfactory temperature. Forced circulation assures movement of a large volume of air throughout plant. Infiltration vitalizes air already in building. Efficiency of workmen is increased because stagnant air is eliminated.

Write for descriptive literature and let our engineering department confer with you regarding your heating requirements.

L. J. MUELLER FURNACE CO.
Established 1857
267 Reed Street
MILWAUKEE, WIS.

Branch offices: Baltimore, Chicago, Detroit, St. Louis, St. Paul, Minneapolis, Fort Collins, Colo., Salt Lake City, Seattle.

MUELLER
Direct-Fired
Forced Air Unit



The Reed Steam Cleaning Tank is sold at a nominal sum to enable all users of unit air filters to maintain their air-cleaning systems more easily, efficiently and economically. (Inset) The Reed Standard Unit Air Filter—clean air at minimum cost.

And Now—quicker, cheaper cleaning of unit filters!

THIS revolutionary development in the maintenance of unit air filters—the Reed Steam Cleaning Tank—permanently eliminates the disagreeable labor of manual washing, insures thorough, uniform cleaning and guarantees a maximum air supply at all times.

The Reed steam-cleaning method removes from the unit air filter—generally recognized as the most efficient type of air-cleaner—the only possible objection to its use in the larger installations. It *boils* the filter clean by live steam—operating on any pressure from two pounds up. Average cleaning time per unit is lowered from ten to two minutes—six to eight minutes restores the dirtiest filter to its highest cleaning efficiency.

Let its use prove its unusual advantages

The Reed Steam Cleaning Tank will quickly pay for itself by savings in maintenance time alone. Full details on the Reed Steam Cleaning Tank will be gladly sent you on request. Use the coupon below for convenience.

REED AIR FILTER COMPANY, *Incorporated*
215 CENTRAL AVENUE, LOUISVILLE, KENTUCKY
Offices in Principal Cities

Reed Air

TRADE MARK

filters ALL METAL

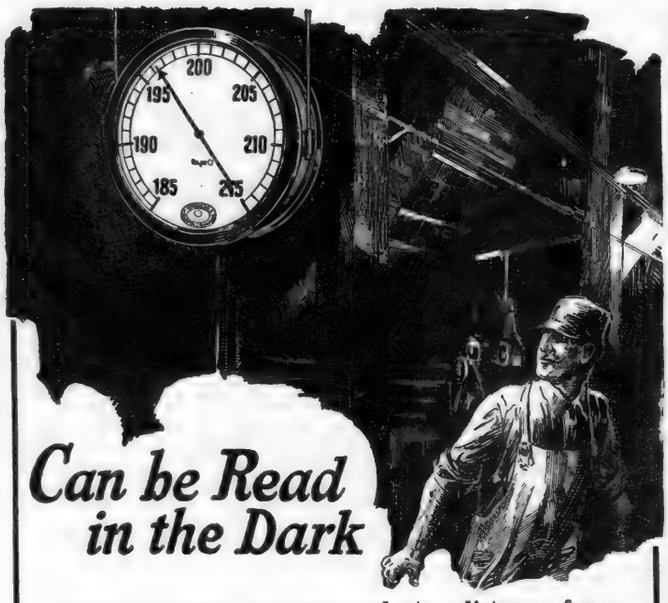
Use This

REED AIR FILTER CO., *Incorporated*
215 Central Ave., Louisville, Kentucky

Send, without obligating me, complete information regarding the Reed Steam Cleaning Tank for unit air filters.

Name ..... City ..... Remarks .....

Company ..... State .....



Can be Read in the Dark

Here's a gauge you can read at a distance, from *either side*, in a *pitch dark* room.

The two opal glass dials are illuminated by a number of ordinary electric lights and there are *no shadows*. Thus, the slightest deviation in pressure can be easily seen, allowing close control.

This gauge has two complete movements and springs coupled to one connection. The new patented spring design has sufficient strength for high pressure and is extremely sensitive, which permits abbreviating the scale so that 15 lbs. on either side of the working pressure appears on dial.

AMERICAN

Double Face Illuminated MASTER GAUGE

may be adjusted for hydrostatic head from *the outside* by means of a key *without removing* glass or pointer.

The steel case is beautifully finished in dull black hard rubber. Furnished with single or double dial in two sizes, 24" and 36". Is completely wired and equipped with plug socket.

Can be suspended by steel rods in a central location in large boiler rooms, or elsewhere, and seen from any point.

Write for Illuminated Master Gauge Catalog A-14.

AMERICAN SCHAEFFER & BUDENBERG CORP.
Brooklyn, N. Y.

Atlanta	Cleveland	Philadelphia	*Seattle
*Boston	Detroit	*Pittsburgh	St. Louis
Buffalo	*Los Angeles	Salt Lake City	Tulsa
*Chicago			

*Stock carried at these branches.

Shows American Illuminated Dial Master Gauge and Illinois Stokers in National Glass Co., Ottawa, Ill.

BAUER

STEEL HEATING BOILERS

Exclusive Territory Open to High Grade Sales Representatives.

Steam—Vapor

Coal, Oil or Gas

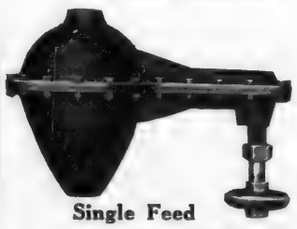
The large combustion chamber with an enormous heating surface to grate makes this a most efficient and economical boiler. Low water line and insulated steel casings make installations easy and quick.

This boiler is an ideal oil burning proposition. Write for literature and prices.

H. C. BAUER COMPANY 38-42 East Allen St. Philadelphia, Pa.

ACTUAL RESULTS

Duplex Feed
List Price $50.00
F.O.B. Louisville



Single Feed
List Price $35.00
F.O.B. Louisville

PATENTED

Fenton Company of Cincinnati, Ohio, have had fifty for the past year. Today they ask for price on twenty-five more.

Bryant Heater Co., Cleveland, Ohio, have ordered five times, not less than ten to twenty at a time.

We Guarantee Our Feeds

The washer is in the Cold Water Line.

Write for catalogue and discounts.

W. M. Cissell Manufacturing Co.

INCORPORATED

111 South Second St., Louisville, Ky.

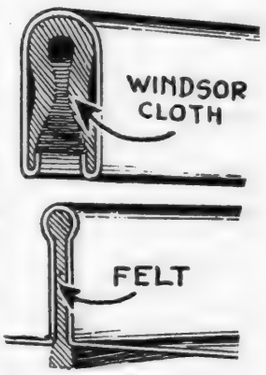
Athey Cloth-Lined Metal Weatherstrip proved so satisfactory in The Blackstone Hotel, that the architects—Marshall & Fox—also used it later in the Edgewater Beach and Drake Hotels

SHUT OUT DRAFTS AND SOOT CUT COAL AND CLEANING BILLS

Athey Cloth-Lined Metal Weatherstrip

Soot plays havoc with the furnishings of fine hotels—drafts mean bigger coal bills. Both are eliminated by Athey Cloth-Lined Metal Weatherstrip. That's why so many of the finest hotels (as well as buildings of all other kinds) are Athey-equipped.

The cloth-to-metal contact—*a patented Athey feature*—does the trick. The metal tongue runs in a *cloth-lined* metal channel, providing a perfect "seal" with sufficient pliability to enable the windows to be opened or closed without sticking. Even when the sash shrinks and becomes loose, the efficiency of Athey strip is not lessened as the contact is pliable enough to take care of such shrinkage.



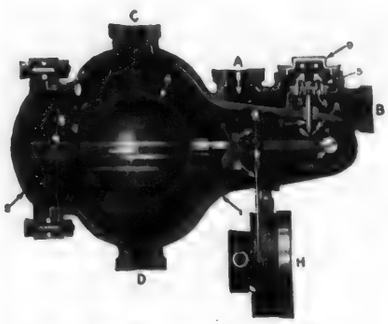
Double Size

Athey Company 6027 West 65th St. Chicago, Illinois

New York City: F. H. KEESE, 7 East 42nd St.
In Canada: CRESSWELL-McINTOSH, Reg'd—270 Seigneurs St., Montreal, Que.

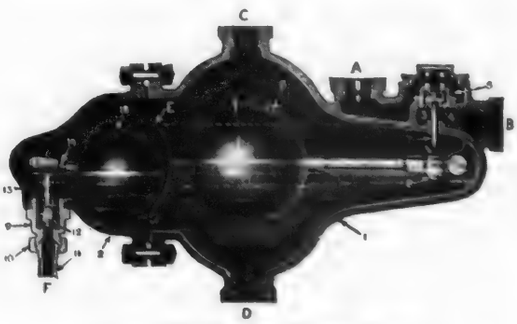
McALEAR

Direct-to-Boiler Water Feeder With Low Water Cutout For Oil Burning Installations



No. 836 Simplex Water Feeder with Low Water Cut-out

Write for Bulletin "H"



No. 826 Duplex Water Feeder

CHICAGO THE McALEAR MFG. CO. ILLINOIS

NO FORCED DRAFT

Breaking the Record for Low Coal Bills and Efficiency!

Low pressure steam and hot water heating boilers and tank heaters that burn No. 1 Buckwheat . . . . . No mixing with expensive coal . . . . . Magazine needs filling only once in 12 to 24 hours . . . . . No blower. No motor. No electric current. No machinery to get out of order . . . . . Twenty-one sizes . . . . . *Coal bills cut one half!*

Have you our Catalog and Price Sheets?

The MOLBY HEATING BOILER and Heavy Duty Tank Heater

MOLBY BOILER COMPANY

(Subsidiary of The Universal Pipe and Radiator Company)

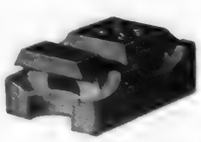
New York: 41 East 42nd St. Landsdale, Pa., 41 Central Ave.

P. S. Be sure to see Molby Boiler Exhibit at the Sesqui-Centennial in the "Government Exhibits and Mines" Palace

Burn anything from Egg to Screenings with Pyramid Grates

The wide range in fuel which PYRAMID GRATES burn makes them highly economical.

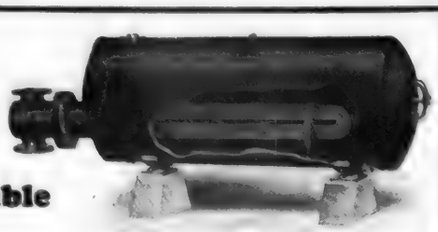
Let us show you how you can cut your coal bills and have satisfactory heating.



PYRAMID IRON PRODUCTS CO.

136 Liberty Street New York City

O. E. F. Storage Heaters Give Dependable Service



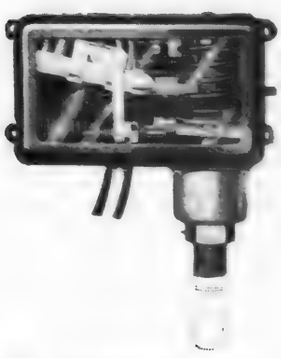
These heaters are made in the U-tube and straight tube types; steel of flange quality used throughout. The heavy gauge seamless drawn copper tubes are expanded into rolled tube sheets.

O. E. Frank Heater & Engineering Co., Inc.

Factory and Offices at Buffalo, N. Y.

Perfect control for buckwheat or culm burners

Mercoid Controls are especially adapted for equipment burning small-size anthracite because Mercoids carry the full line current and have a wide range of adjustment



No. 848 Mercoid Boiler Control for steam, vapor, or hot water. (Dotted line shows bulb for hot water control.)

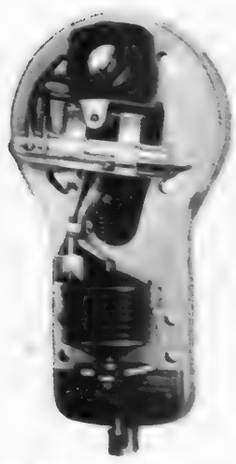
MERCOID Controls automatically make and break the circuit to the blower motor with change of temperature or pressure. They carry the full line current—no transformer—no open arc—no corrosion of contacts. Rated at 110 volts—10 amperes, or 220 volts—5 amperes.

Boiler Controls

No. 848 Model A-1 for low pressure steam boilers can be adjusted to maintain pressure between 1 lb. and 15 lbs. Adjustable for control as close as 1 lb. or as wide as 5 lbs. Model B-1 for pressures 10 lbs. to 60 lbs. B-4 for pressures 60 lbs. to 100 lbs. A-3 for pressure and vacuum.

No. 848 Model C for vapor boilers—adjustable for pressure from 1 oz. to 5 lbs. Control as close as 1 oz. or as wide as 5 oz.

No. 848 G-1 for hot water boilers. Adjustable for temperatures between 110° and 220°. Also adjustable for control as close as 5° or as wide as 50°. Furnished with straight or angle connection at bulb.



No. 845 Mercoid Thermostat for room temperature control (cover removed).

Room Temperature Control

For residences and small buildings, No. 845 Mercoid Thermostat is connected in series with the boiler control and motor. As the room temperature changes, the blower is stopped or started. (Boiler Control operates independently as a limiting device.) Easily adjustable between 56° and 80° by moving indicator. Special ranges also furnished.

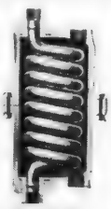
Mercoid Controls have a wide adaptation for control of temperature, pressure or vacuum. They are now being used for oil burners, unit heaters, blowers, refrigeration and a host of other industrial applications.

AMERICAN RADIATOR COMPANY

SPECIALTIES DEPARTMENT

816 South Michigan Avenue Chicago, Illinois

Hot Water—
for large buildings or small dwellings

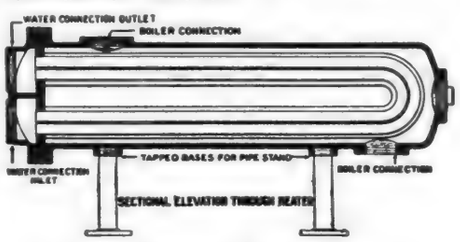


DOMESTIC WATER HEATER

For dwellings. Fits any steam, vapor or hot water system. Capacities from 30 to 300 gals.

STORAGE WATER HEATER

Where large quantities of hot water are held in reserve for intermittent use. Will heat from 200 to 20,000 gals. per hour, up to 180° F.



For Greater Capacities—
Paracoil U-Tube Water Heaters

You will find Paracoil Water Heaters giving complete satisfaction in the largest public buildings, apartments and hotels, and in the smallest private dwellings.

When you specify a hot water heater you can safely write in "Paracoil" Domestic Heater, "Paracoil" Storage Water Heater, or "Paracoil" U-Tube Instantaneous Heater, according to the unit required.

In any case the safe word to specify is "Paracoil."

Our engineers will be pleased to figure out the best type and the proper capacities for you—and our rigid guarantee of performance stands back of their judgment.

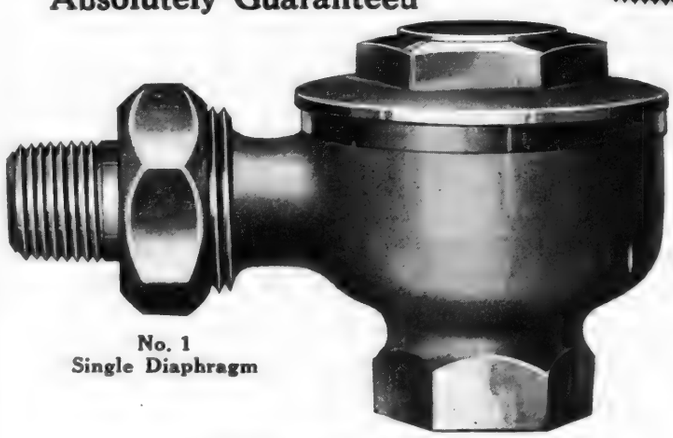
Write for Paracoil Catalogs

DAVIS ENGINEERING CORP.
90 WEST STREET, NEW YORK CITY
FACTORY: ELIZABETH, N. J.

Paracoil
WATER HEATERS

W. D. CASHIN CO.
THERMOFLEX

RADIATOR TRAPS
are Substantially Built
Properly Priced
Absolutely Guaranteed



No. 1
Single Diaphragm

No. 3
Bellows Diaphragm

Thermoflex Radiator Traps are made in single and bellows types to suit any condition.

It will pay you to investigate our claims and convince yourself that there is no finer product on the market today.

The Thermoflex line is complete. Send for catalogue.

DISTRIBUTORS:

Sim D. Rollins Co.	Minneapolis
C. R. Lingo Eng. Sales Co.	Cincinnati
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Morton Mol. Dukehart Co.	Baltimore
Geo. W. Kenney	Poughkeepsie, N. Y.

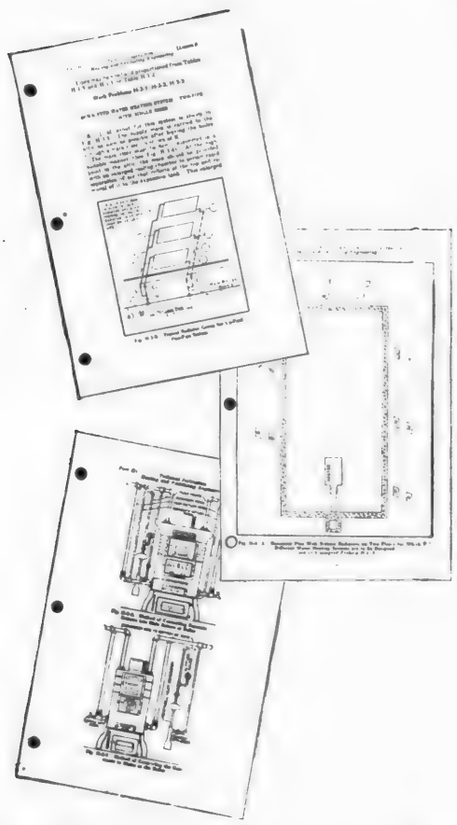
MANUFACTURED BY

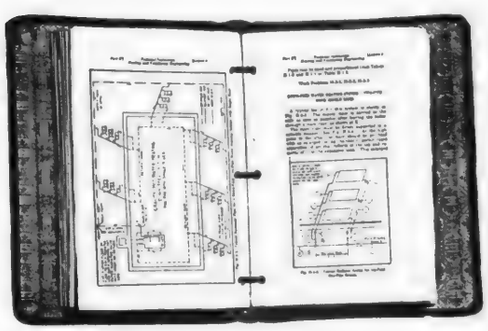
W. D. CASHIN COMPANY
35 Hartford St. BOSTON, MASS.

At last What you have been waiting for—*in loose leaf form*

NEW HOME STUDY COURSE

in GRAVITY, STEAM *and* WATER HEATING





The New Home Study Course in Gravity Steam and Water Heating which has been one of the most popular features in THE HEATING AND VENTILATING MAGAZINE during the past two years is now ready in loose-leaf form (without instruction and work problem features) for the astonishing low price of

$10.00

Never before offered in reprinted form except to purchasers of the correspondence course which sells for $120.00.

First eighteen lessons are now reprinted and ready. The balance of the course, approximately twelve lessons, will be sent to you without additional cost as soon as reprinted after publication in THE HEATING AND VENTILATING MAGAZINE. Each lesson is paper bound and punched for ring binder.

Ring-binder with heavy cloth binding specially designed to hold course will be furnished for $1.35. One binder will hold the first eighteen lessons now ready. Two binders are necessary to hold the entire course.

Only a limited number of the course has been reprinted. Avoid disappointment by mailing the coupon now.

HEATING AND VENTILATING MAGAZINE CO.
1123 Broadway
New York, N. Y.

.....19...

Gentlemen:

Yes, I want the Home Study Course in reprinted form (without instruction work problem features). Enclosed is $10.00 in payment for the complete course. I also enclose .....for..... binder. Price of binder, $1.35 each.

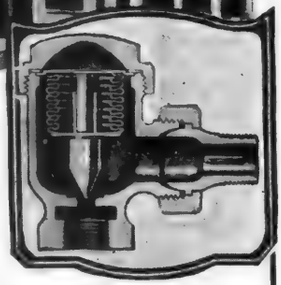
Name .....

Street .....

City and State .....

Mack Truck Plant Uses SARCO Radiator Traps

J. F. Musselman,
Engineer



It is a convincing tribute to the performance of Sarco Radiator Traps that the International Motor Co., one of the most successful motor truck manufacturers, should install 474 Sarco Radiator Traps in the plant illustrated.

To specify "Sarco" Traps is to insure lasting satisfaction.

They are factory adjusted, noiseless, and won't freeze or air-bind. Are self-cleaning and easy to take apart. Have a high lift and unusually large discharge opening.

The helical tubing insures long life, for it has more convolutions than the disc type, therefore less stress of the metal.

Heavy wall tubing permits use up to 50 lbs.

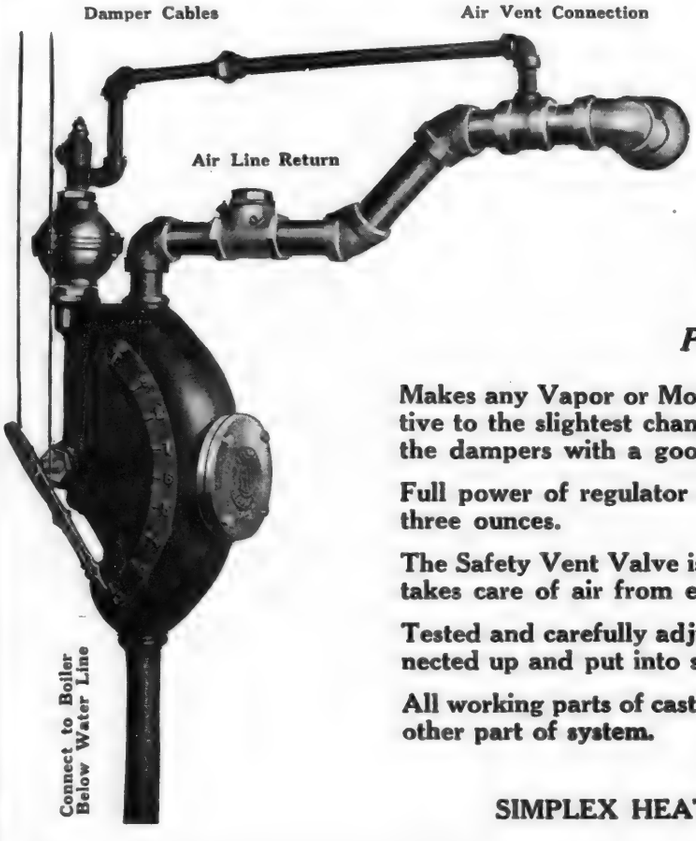
Ask for Radiator Trap Booklet P-135, also for new Packless Inlet Valve Booklet P-153.

SARCO CO., Inc.

183 MADISON AVENUE, NEW YORK CITY

Boston Buffalo Chicago Cleveland Detroit Philadelphia

PEACOCK BROS., LTD., MONTREAL



Wiley

Safety-Vent Vapor Regulator

POWER IS ITS MIDDLE NAME

Makes any Vapor or Modulating System safe and satisfactory. Sensitive to the slightest change in pressure. Has ample power to control the dampers with a good working margin.

Full power of regulator is exerted within a pressure range of two or three ounces.

The Safety Vent Valve is a distinguishing feature of this regulator and takes care of air from entire heating system.

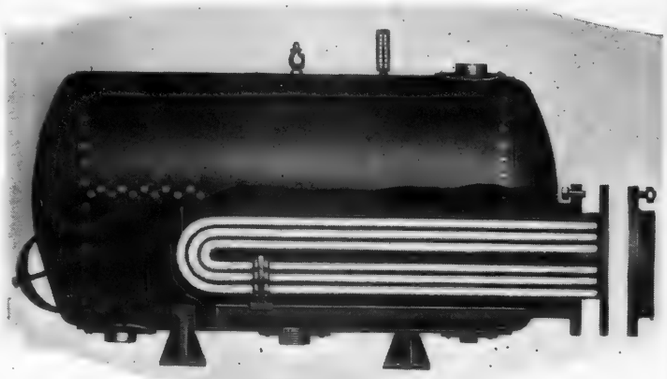
Tested and carefully adjusted before leaving factory, ready to be connected up and put into service, with the least trouble and expense.

All working parts of cast bronze. Will last as long as the boiler, or any other part of system.

Write for details

SIMPLEX HEATING SPECIALTY COMPANY, Inc.
LYNCHBURG, VA.

NATIONAL
Storage U BEND TYPE Heater



A fine building deserves a Solid Copper Storage Heater

Consider the thousands of dollars poured into a first class building. Consider the value of solid copper construction in a vital organ of the interior where copper alone is the final answer to the hot water problem.

Solid Copper is superior in every way to cast iron or copper lined shell heaters. Year after year it delivers clean hot water without a dollar expended for upkeep. It can never wear out. The National Solid Copper Heater is the practical heater for really fine buildings.

Here are the specifications:

Solid Copper shell fabricated in accordance with Standard Boiler Practice, and made of pure electrolytic copper.

Heavy Copper tubes, seamless drawn, of heavier gauge than ordinarily used.

Cast Bronze Tube Plate also bronze tappings and supports. All parts coming in contact with the water are of non-ferrous metal.

You will be surprised to learn how favorably the price of this indestructible heater compares with other classes of heaters. Write us for quotations.

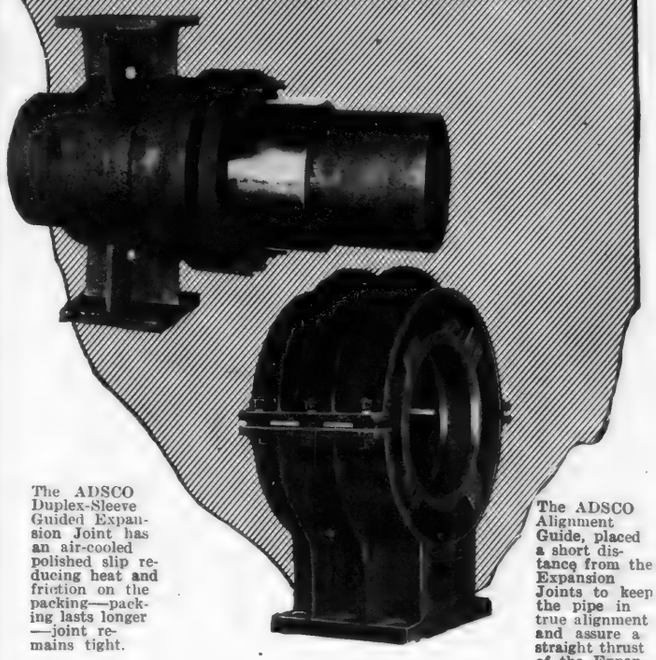
The National Pipe Bending Co.

Established 1883 **120 River Street**

New Haven, Conn.

BOSTON NEW YORK PHILADELPHIA

ADSCO EXPANSION JOINTS



The ADSCO Duplex-Sleeve Guided Expansion Joint has an air-cooled polished slip reducing heat and friction on the packing—packing lasts longer—joint remains tight.

The ADSCO Alignment Guide, placed a short distance from the Expansion Joints to keep the pipe in true alignment and assure a straight thrust of the Expansion Joint Slip.

ADSCO EXPANSION JOINTS

Are Built for Every Possible Service Requirement; for any Pressure or Temperature. Many have been in use 49 years.

Use the coupon below for Bulletin 201-H. It is more than a catalog. It is a reference book, useful to any engineer who may ever specify Expansion Joints.

AMERICAN DISTRICT STEAM COMPANY

GENERAL OFFICES AND WORKS
NORTH TONAWANDA, N.Y.

Offices:
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PIN THIS COUPON TO YOUR LETTERHEAD

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AMERICAN DISTRICT STEAM COMPANY North Tonawanda, N. Y.

Please send Bulletin 201-H on Adsco Expansion Joints to

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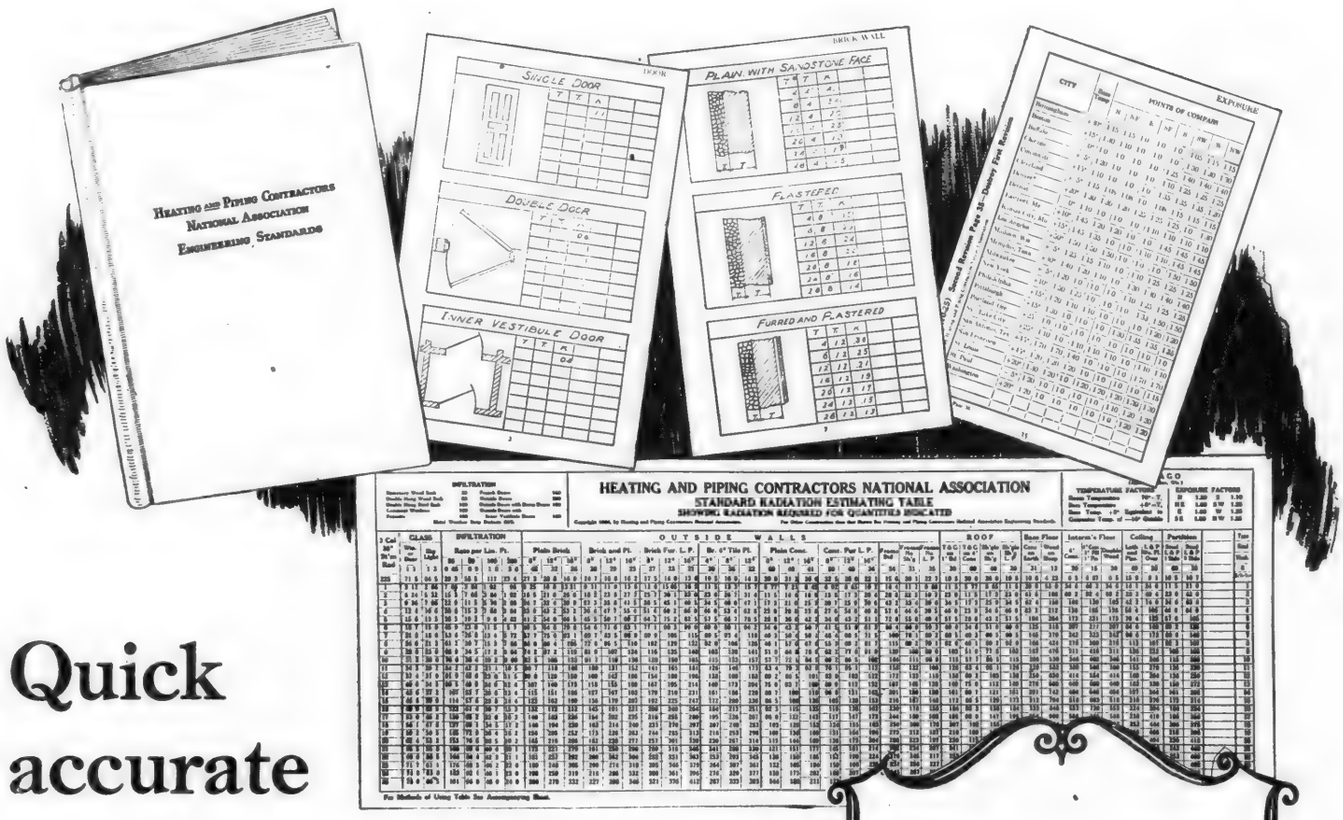

Quick accurate ESTIMATION of RADIATION

A simple fool-proof method is available for every heating contractor.

A wealth of information on radiation has been compiled by a group of America's foremost heating engineers. Over $100,000 has been spent in time and money by the Heating and Piping Contractors National Association so heating contractors may have a reliable guide, so time may be saved, so radiation may be **accurately** estimated. Contractors find this book worth many times its weight in gold. 151 constants are given for various types of construction and thickness of wall, infiltration factors, exposure factors, and other information needed to figure radiation quickly and correctly.

The complete work, in a loose leaf binder, entitled "Engineering Standards" may be obtained by readers of this magazine for $5.00. Standard Radiation Estimating Tables for any one of the twenty-four cities listed in the panel at the right is given with each book. Please signify the city desired. If your city is not listed, request chart for city nearest your locality.

Fill in the coupon and order today. A heavy demand necessitated a reprint of this book, which reprint is now available.

HEATING AND VENTILATING MAGAZINE,
1123 Broadway, New York, N. Y.

Date.....

Send me copy of "Engineering Standards" complete with all data necessary to correctly estimate radiation in any type of building. Also include Radiation Table for City of.....

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Enclosed find $5.00 to cover cost and postage.

Name.....

Address .....

City and State.....

The Heating and Piping Contractors National Association

—1926 is the 37th year of this nation-wide organization of heating and piping contractors.

America's leaders in heating and piping work are numbered among its members.

Its book on radiation compiled by the Committee on Standardization is a notable example of the beneficial work carried on by the Heating and Piping Contractors National Association.

Birmingham, Ala.	Milwaukee, Wis.
Boston, Mass.	New York, N. Y.
Buffalo, N. Y.	Philadelphia, Pa.
Chicago, Ill.	Pttsburgh, Pa.
Cincinnati, Ohio	Portland, Ore.
Cleveland, Ohio	San Francisco, Cal.
Denver, Colo.	Salt Lake City, Utah
Detroit, Mich.	San Antonio, Texas
Eastport, Me.	St. Louis, Mo.
Kansas City, Mo.	St. Paul, Minn.
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Madison, Wis.	
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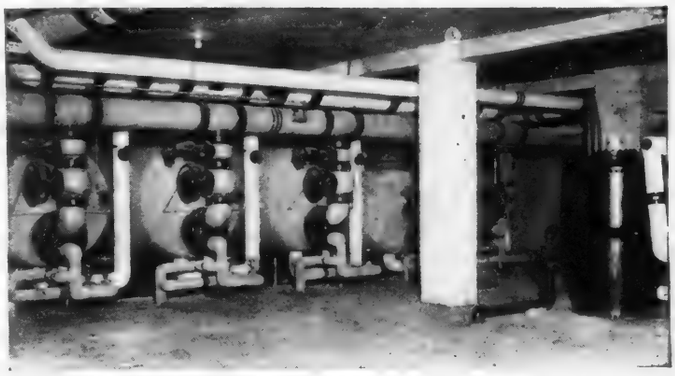
Architects:
ZANTZINGER, BORIE,
AND MEDARY
Philadelphia, Penn.



Heating Contractors:
V. N. WELAMB CO.
Philadelphia, Penn.

WHITLOCK HEATERS AT PENN ATHLETIC CLUB

These five Whitlock Type K Storage Heaters amply supply the hot water service needs of the magnificent new Penn Athletic Club, serving rooms, kitchens, and laundry with continuous hot water.

Practically every modern building has some need for hot water. Whitlock Engineers, heat transfer specialists, have been recommending the proper equipment for all kinds of hot water needs for many years.

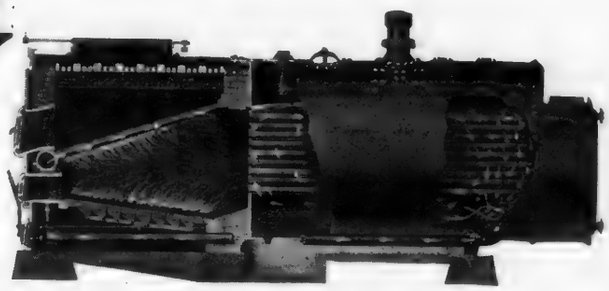
Whitlock Heaters are correctly designed, properly proportioned, and carefully built for the service for which they are recommended.

The extra precaution of consulting the nearest Whitlock Engineer when you are considering hot water requirements is well worth while.

THE WHITLOCK COIL PIPE COMPANY
40 South Street, Hartford, Conn.
New York, Boston, Philadelphia, Chicago, Baltimore, Pittsburgh, San Francisco, and other principal cities. Consult telephone book.

WHITLOCK
HEAT TRANSFER
PRODUCTS

Improved



Stanwood engineers have discarded old precedents and customs—produced a radical departure from yesterday's ideas—and proven by severe tests in most difficult installations that the Stanwood boilers deliver the most service for the least amount of money of any boiler on the market.

Such common sense ideas as the following are points where expense is reduced in installation, operation and maintenance:—

Because of low water line costly excavating is not needed. The rapid water circulation minimizes scale formation. The absence of mudlegs is an absence of expense and trouble. No staybolts mean no grief from corrosion a few years hence. A front that opens like a door affords immediate and quick cleaning.

Write for detailed pamphlets on this epoch making boiler. 17 features combine to make it a money saver in installation, operation and maintenance.

STANWOOD
Smokeless **BOILERS**

WORKING PRESSURES 15 to 250 lbs—Sizes 29 to 200 hp

Manufacturers also of Horizontal Return Tubular Boilers, Stacks, Tanks, Breechings and Throttling and Automatic Steam Engines.

THE STANWOOD CORPORATION
Cincinnati, O. Est. 1891

THE STANWOOD CORPORATION, Dept. D-12
Cincinnati, Ohio.

Please send me pamphlets describing in detail the Stanwood Boiler.

Name .....

Business .....

Address .....

MOUAT VAPOR HEAT

"SUPREME IN SATISFACTION"

Worthy of Your Endorsement!

SELLING heating comfort is a pleasurable job if you specify Mouat Vapor Heat.

The satisfaction of being absolutely certain you are giving your customer the best, and the knowing that you have firmly established yourself in their good graces, is a valuable asset to those who are building for the future.

Send for detailed information regarding the Mouat Vapor Heating System and the unusual co-operation extended to those specifying its use.

THE MOUAT VAPOR HEATING COMPANY

1240 West Fourth Street ~ Cleveland, Ohio

HEATING SYSTEM CONTROL FROM THE POWER PLANT

THE largest single hot water heating system in the world, located in New York City, serving a group of buildings of approximately eight city blocks, is regulated entirely from the power plant by hourly inspection of outside temperature and adjustment of the steam pressure in Wainwright heaters, and the speed of the Wheeler Alberger circulating pumps forcing the water through the heating system.

A single season's experience furnished the necessary data for predetermining the outgoing water temperature necessary for comfortable heating results at various outside temperatures and individual control of the thousands of radiators in hotel and office rooms served from this plant is entirely avoided.

Consult our Engineering Department

WHEELER CONDENSER & ENGINEERING CO.

149 Broadway, New York

Works - CARTERET, N.J., NEWBURGH, N.Y.

26

THERMO SYPHON TRAP

For All Types of Steam Heating Systems

Boiler Protection

Boilers are safeguarded against burning or cracking when equipped with Thermo Syphon Traps. All condensation is returned to the boiler, maintaining the water line, regardless of pressure or vacuum.

As well as protecting the boilers, Thermo Syphon Traps assure proper circulation and noiseless operation. Prevent air-bound or water-logged conditions.

Especially designed to handle condensation from any type of one-pipe or two-pipe steam heating system. Approved by heating experts and used with success on the various prominent patented Vapor, Vacuum, Atmospheric and Modulation Systems. Send for Bulletin No. 16-HV, giving full details.

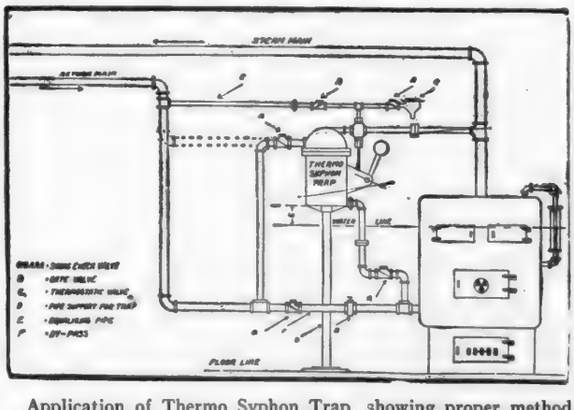
LYTTON MANUFACTURING CORPORATION

HIGH GRADE

Return, Vacuum, Lifting and Separating Steam Traps

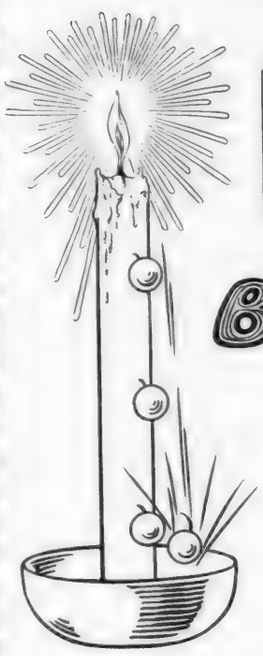
Reducing Valves **Blow-off Valves**

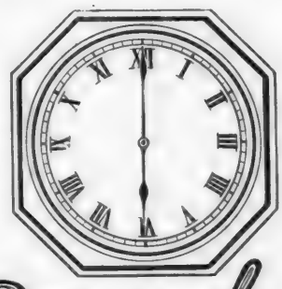
FRANKLIN, VIRGINIA



Application of Thermo Syphon Trap, showing proper method of piping, for draining any heating system.

For draining vapor, vacuum or any system *without pressure on the returns*, the return line may be run direct to inlet of trap as shown by dotted line.





BANG!

Another Hour Gone

They used to tell time with a candle.

But who would try to catch a train by candle time today?

Today you want the very latest time-piece that science can provide.
You can't afford to take chances.

It's like that with boilers.

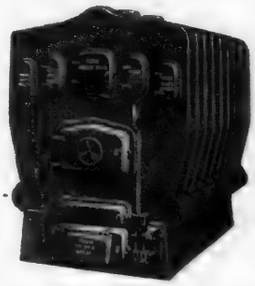
The old hit or miss way of getting boiler and radiation into adjustment are not good enough for you.

That's why Burnham Boilers are designed to build up radiation capacity, section by section, with always a perfect balance between fire travel and draft.

So many sections,—so much radiation.

It's as certain as clockwork.

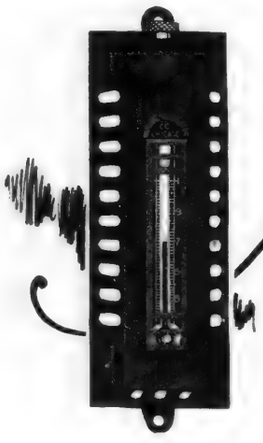
If you have used Burnhams, you know it's so.



Burnham Boiler Corporation

IRVINGTON, N. Y.

New York Office: 30 East 42nd Street
Representatives and Branch Offices in Principal Cities of U. S. and Canada



National Regulation

"... our plant gives us 100% satisfaction ... we never have any trouble and our operator is delighted ... maintains a uniform degree of heat and ventilation through the building ... source of great pleasure to show visitors, trustees and officials just what the National system of temperature control is doing for us."

Enough to show trend of a letter to us from a school principal of Northwest Canada.

NATIONAL REGULATOR CO.
2301 KNOX AVENUE CHICAGO

"Keeping Others In Hot Water"—

for
Hotels, apartment buildings, hospitals, Y. M. C. A. buildings, schools and laundries

Special Attention Given to Installations Requiring Large Quantities of Hot Water, with Live or Exhaust Steam as the Heating Medium.

—may be a pastime for some folks, but for the Sims Company it is a serious proposition—a matter requiring a thorough knowledge of hot water requirements.

A long study of these requirements enables us to offer heaters that assure constant and efficient hot water service.

Engineers feel safe in specifying "SIMS" because they know it means **reliability**—a service you want to render your client.

SIMS CLEAN E-Z STEAM TUBE STORAGE HEATER

Our Engineers will gladly confer with you, without obligation, on your hot water problems.

THE SIMS CO.

Erie, Pa.

A good place to live, to work and to play.

BROWNELL BOILERS

STEEL RIVETED BOILERS

of Accurately Known Strength

Brownell Boilers need no introduction. They were on the job before the Civil War and they are on the job yet. We draw on those many years of boiler making experience when we declare that no man —no matter what his heating problem—can afford to install anything other than a steel, riveted boiler of accurately known strength.

Specify Brownell Boilers for Heating Plants because

COST—They arrive in one piece and are installed in one piece. Expense of assembling sections eliminated. Insurance rate low.

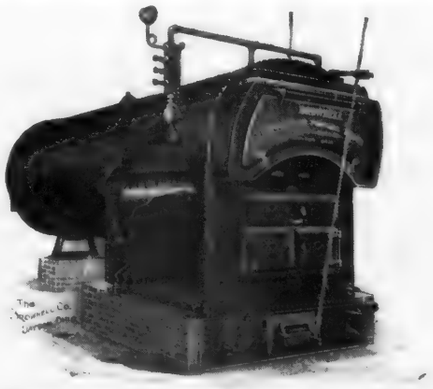
EFFICIENCY—High thermal conductivity. Great tensile strength. Uniform thickness of plate. Generous and properly designed fire box, permitting complete combustion. Easy access for cleaning, insuring clean heating surfaces.

MAINTENANCE—Boilers capable of standing sudden and extreme changes of temperature because of high factor of safety, and nature of material. No long and expensive shut-downs while waiting for repair parts.

Brownells comply with ASME and all state codes.

The Brownell Company
Dayton, Ohio, U. S. A.
Established 1858

Representatives everywhere—ready to serve.
Bulletin B6A ready to mail.



Return Flue Portable Boiler—Smokeless Type

1-2-3-4- *nearly*

$5,000,000

in 90 days—that's the verdict on the

New *Silent* Nokol

UP, up, up—go the sales figures on the new *Silent* NOKOL. Nearly $5,000,000 in 90 days—$4,828,781 to be exact—more than $1,500,000 a month!

You can't ignore such evidence as this. Never in the history of oil heat have such figures even been approached. Never in its 9 years of leadership has the NOKOL held such a commanding position as today.

Ask any one of the 35,000 home owners who depend on NOKOL. Every one will tell you an enthusiastic story of luxurious winter comfort —of carefree automatic heat—of freedom from the dirt and drudgery of coal, ashes and soot. And now that the noise bogey has been conquered, owners are even more enthusiastic still.

If the NOKOL franchise is open in your community, here's an opportunity you can't afford to overlook. Write today for booklets and full details of our dealer proposition.

NEW *Silent*

NO COAL **NOKOL**

REG. U.S. PAT. OFF.

AUTOMATIC OIL HEATING FOR HOMES

FREE—NEW BOOK

AMERICAN NOKOL COMPANY
Dept. 26, 215 North Michigan Ave., Chicago, Ill.

Please send your new book on OIL HEAT. Also dealer proposition.

Name.....

Address.....

City..... *State*.....

The Choice of Men Who Know

Years ago the Book Estate, Detroit, Mich., installed a Patterson Hot Water Heater in one building. It made good, so good, in fact, that Patterson Hot Water Heaters have been selected for the following Book Estate buildings.

Patterson Hot Water Heaters

are now in use in the Book Tower Bldg., shown below; the Book Bldg., at the left; the Book-Cadillac Hotel; the Industrial Bank Bldg., and the Real Estate Exchange.

Once a Patterson user, always a Patterson user. For forty-five years these heaters have been the choice of men who know.

Patterson Heaters are guaranteed to give all the hot water required, as hot as required, and when required.

Catalog may be had for the asking.

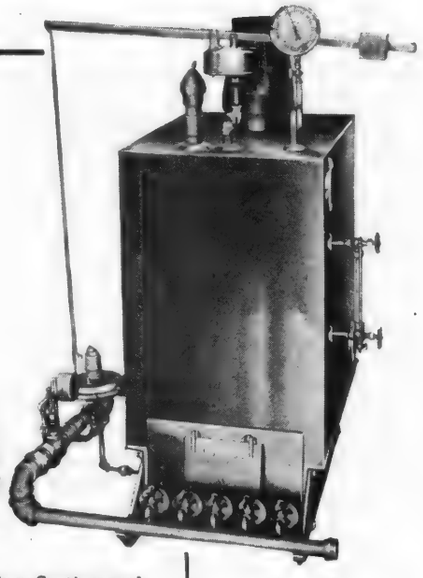
The Patterson-Kelley Co.

107 East 40th Street
NEW YORK, N. Y.

Universal Cast Iron Sectional Gas Boilers

For Natural or Manufactured Gas

If METALLIC JACKET is not wanted, deduct from the net, $13.50 for a 3 Section Boiler and $1.25 net for each additional section over three.



With Special Circulating Section and Metallic Jacket lined with Super-Firefelt

Boiler Number	Steam Rating	Number Sections	List Price	Approximate Shipping Weight
31 TS	330	3	$208.00	735
41 TS	480	4	255.00	1137
51 TS	660	5	312.00	1300
61 TS	840	6	367.00	1475
32 TS	1020	7	421.00	1629
42 TS	1200	8	460.00	1789
52 TS	1380	9	512.00	1954
62 TS	1560	10	564.00	2116
72 TS	1740	11	615.00	2281
33 TS	1920	12	665.00	2445
43 TS	2100	13	714.00	2606
53 TS	2280	14	762.00	2767
63 TS	2460	15	809.00	2928
73 TS	2640	16	863.00	3004
34 TS	2820	17	909.00	3227
44 TS	3000	18	962.00	3319
54 TS	3180	19	1006.00	3582
64 TS	3360	20	1059.00	3741
74 TS	3540	21	1102.00	3938
85 TS	3720	22	1154.00	4095
45 TS	3900	23	1196.00	4257
55 TS	4080	24	1248.00	4431
65 TS	4260	25	1288.00	4604
75 TS	4440	26	1339.00	4769
86 TS	4620	27	1379.00	4932
46 TS	4800	28	1429.00	5100
56 TS	4980	29	1467.00	5263
66 TS	5160	30	1518.00	5433
76 TS	5340	31	1554.00	5668

Steam Boilers—Height to water-line 29 in. Height to top flue opening 38 in.

Patented

Universal Gas Boiler with Metallic Jacket The front panel is easily removable for cl aning.

STEAM OR VAPOR BOILERS

Outlets, 2-3".

Fifteen - section boilers and over have one extra 1½" outlet for every 10 sections.

Returns, 2-3".

Trimmings—Safety valve, steam gauge, water glass complete with try-cock, automatic gas control valve, automatic steam pressure regulator, metal bellows type; pilot, complete with lava tip and cut-off valve.

WATER BOILERS

Outlets, 2-3".

Returns, 2-3".

Trimmings—Thermometer, altitude gauge, automatic gas control valve, pilot.

With Plain Section and Metallic Jacket lined with Super-Firefelt

Number	Steam Rating	Water Rating	Number Sections	List Price Water	List Price Steam	Approx. Shipping Weight
31 PS and PW	300	480	3	$146.00	$188.00	715
41 PS and PW	400	665	4	194.00	227.00	1017
51 PS and PW	550	905	5	241.00	275.00	1150
61 PS and PW	700	1145	6	288.00	322.00	1293
32 PS and PW	850	1385	7	332.00	369.00	1419
42 PS and PW	1000	1625	8	363.00	399.00	1549
52 PS and PW	1150	1865	9	406.00	445.00	1684
62 PS and PW	1300	2105	10	450.00	488.00	1816
72 PS and PW	1450	2345	11	492.00	533.00	1951
33 PS and PW	1600	2585	12	534.00	575.00	2085
43 PS and PW	1750	2825	13	575.00	617.00	2216
53 PS and PW	1900	3065	14	616.00	658.00	2347
63 PS and PW	2050	3305	15	654.00	698.00	2478
73 PS and PW	2200	3545	16	700.00	744.00	2614
34 PS and PW	2350	3785	17	737.00	784.00	2717
44 PS and PW	2500	4025	18	782.00	828.00	2879
54 PS and PW	2650	4265	19	819.00	867.00	3012
64 PS and PW	2800	4505	20	863.00	911.00	3141
74 PS and PW	2950	4745	21	899.00	949.00	3278
35 PS and PW	3100	4985	22	943.00	993.00	3405
45 PS and PW	3250	5225	23	977.00	1029.00	3537
55 PS and PW	3400	5465	24	1021.00	1073.00	3681
65 PS and PW	3550	5705	25	1054.00	1108.00	3824
75 PS and PW	3700	5945	26	1098.00	1151.00	3959
36 PS and PW	3950	6185	27	1130.00	1185.00	4092
46 PS and PW	4100	6425	28	1173.00	1228.00	4231
56 PS and PW	4250	6665	29	1204.00	1261.00	4363
66 PS and PW	4400	9605	30	1246.00	1304.00	4503
76 PS andPW	4550	7145	31	1276.00	1335.00	4708

Steam Boilers—Height to top flue opening 38 in. Height to water-line 26 in.
Water Boilers—Height to top flue opening 38 in.

Universal Smokeless Boiler Co.
Ravenna, Ohio

COMMONWEALTH LAVIGNE

Hot Water Radiator Valve

Angle Pattern

Number 202

THIS patented valve is original in design and singularly free from the vice of sticking. The working parts are all made from brass rod and castings, the shell and stem being cast in one piece. The shell has only a narrow bearing at top and bottom of body and, when the handle is turned, the positive up-and-down motion of the shell prevents sticking. The stem is packed with an asbestos ring having a metal insert. Valve is opened or closed by a half-turn of the handle. The forged brass tail nut insures freedom from installation troubles caused by cracked or broken tail nuts.

In addition to a complete line of standard radiator valves, we also manufacture the Lavigne Packless Quick Opening Steam Radiator Valve.

No. 432 Steam Radiator Valve. Corner Pattern.

Graduated Packless Steam Radiator Valve.

Your Jobber Can Supply You

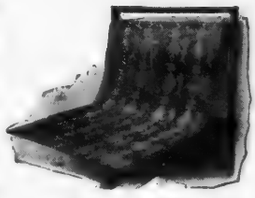
COMMONWEALTH BRASS CORPORATION

Detroit, Michigan

JENARCO is a red vulcanized rubber sheet packing for hot and cold water, saturated steam.

Available in ready-cut gaskets

All brands of Jenkins Packings are supplied in ready-cut gaskets when you have occasion to use a number of the same size. You save money and time by having them ready-cut.



JENKINS '96 is a black unvulcanized rubber sheet packing for hot and cold water and saturated steam.

The gaskets are cut by machine to any size or shape desired.

Jenkins Ready-Cut Gaskets.

Jenkins Packings which are available in sheet or gasket form include Jenarco, Jenkins '96, Compressed Asbestos Jointing and Oiltite.

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JENARCO Jenkins Packing
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The super silent

SWORD

automatic oil burner

operates on a principle which marks the true opening of a great new era in home heating. Oil is pumped through a self-cleaning gun and atomized against a target. Hot combustion gas enters the pipe and is blown to the gas pot, where the atomized oil is vaporized. The resulting gas brings in a clean, silent flame.

SILENCE

The Sword principle of combustion, which is patented and exclusive with the Sword Burner, makes possible a flame as silent as a coal fire.

CLEANLINESS

Combustion with this method is so complete that the oil burns without odor, soot, or smoke. There is nothing formed to stop up the flues, nor is there any carbon expelled into the atmosphere.

EFFICIENCY

Complete combustion, combined with the unique shape of the flame, which brings the heat close to the furnace walls and holds it down in the furnace, greatly reduces chimney losses.

UNIFORMITY

The Sword Burner is equipped with the latest and most efficient type of thermostat which assures absolute automatic action and uniform heat throughout the house regardless of the weather conditions.

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Both need "shaking up" before they're used— to get full benefit

HEATED AIR, propelled in steady currents to all parts of the room, is the most healthful—and the most economical—method of heating.

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Johnson Unit Heaters

"Vento" Gives Assurance

The Vento Automatic Valve gives an assurance of perfect control—Not a particle of steam gets away—Nothing gets out that should stay in; nothing stays in that should get out.

Further, and of importance—the Vento valve mechanism is so simplified as to render it an easy, quick task to remove all internal parts;—the ordinary layman may with ease take apart and reassemble. This makes Vento very valuable.

Superior Assets—

of the "Vento System"

System starts with valve wide open, assuring circulation almost the instant steam is turned on.

Control of valve opening from two to eight times larger than other makes of valves.

Size of valve opening reduces danger of fouling with scale or other foreign matter.

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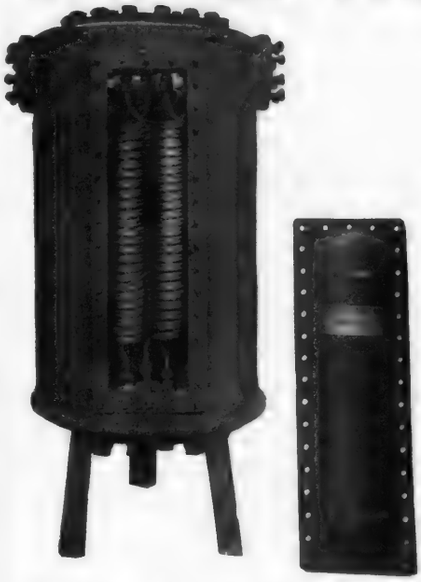
VENTO

Hotter Water with Less Fuel—

The Reilly Water Heater



has the highest rate of heat transfer of any closed heater on the market. Besides its unequalled efficiency, several special features of construction make it the best heater for dependable year-in, year-out, service.

Every coil and joint of the Reilly Water Heater can be inspected and made tight *while under pressure and without breaking any pipe joint* —an exclusive Reilly Heater feature.

Expansion strains on headers or tubes are prevented by the spring-like crimped coils—another exclusive Reilly Heater feature.

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H&VM-12-26

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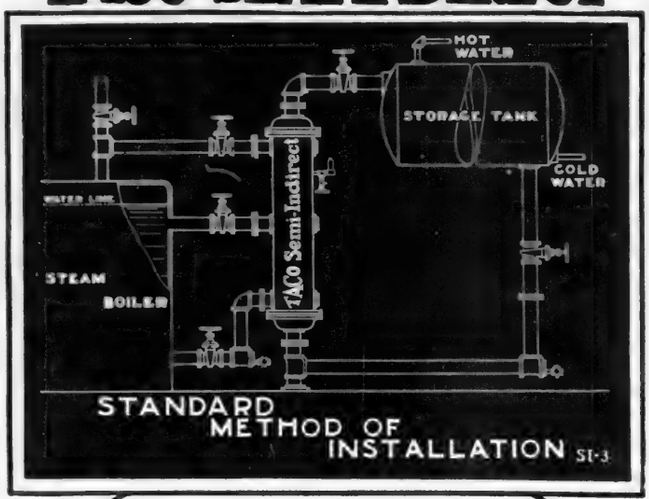

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Tanks will be heated down to a level with the bottom of the heater.

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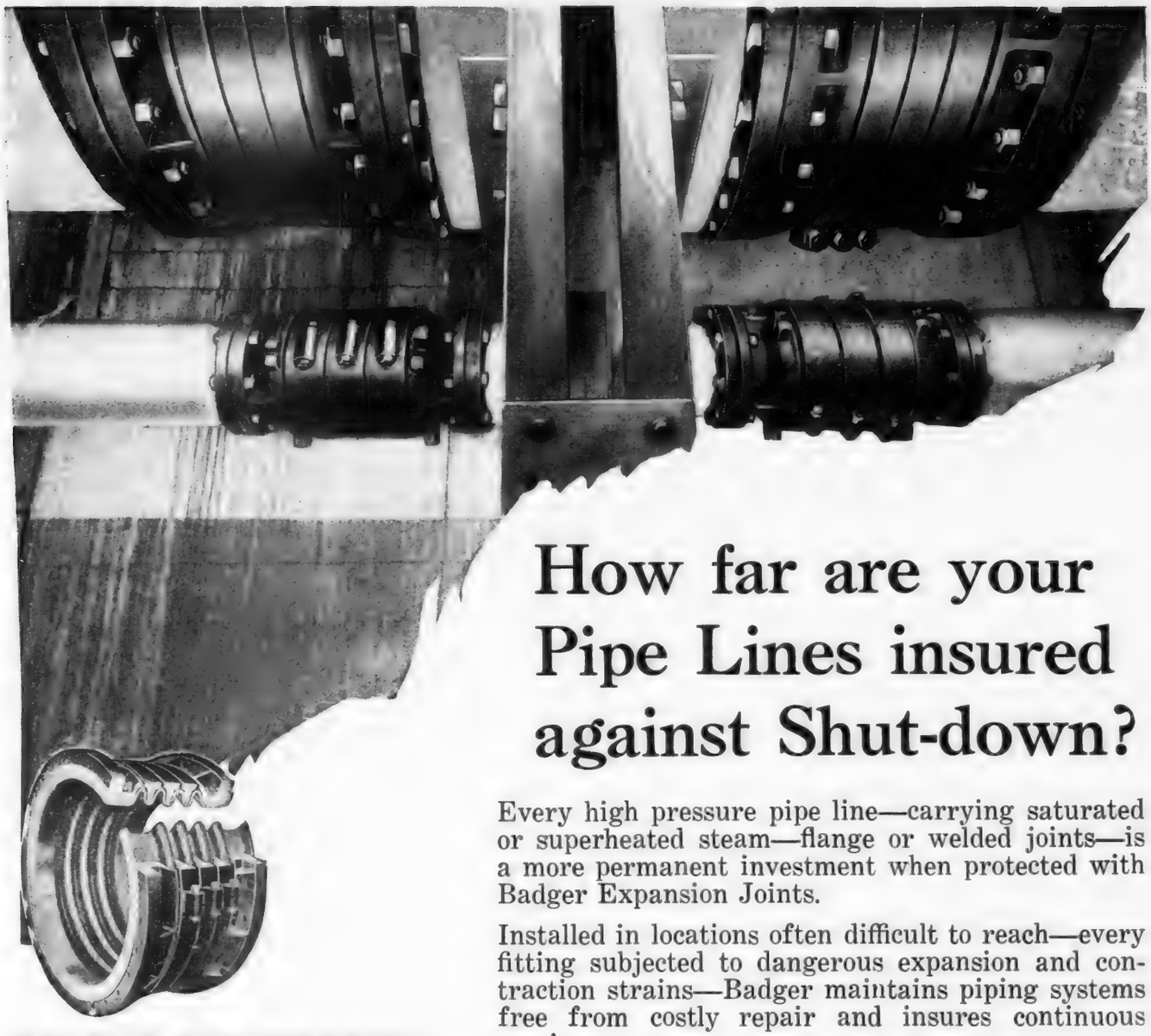

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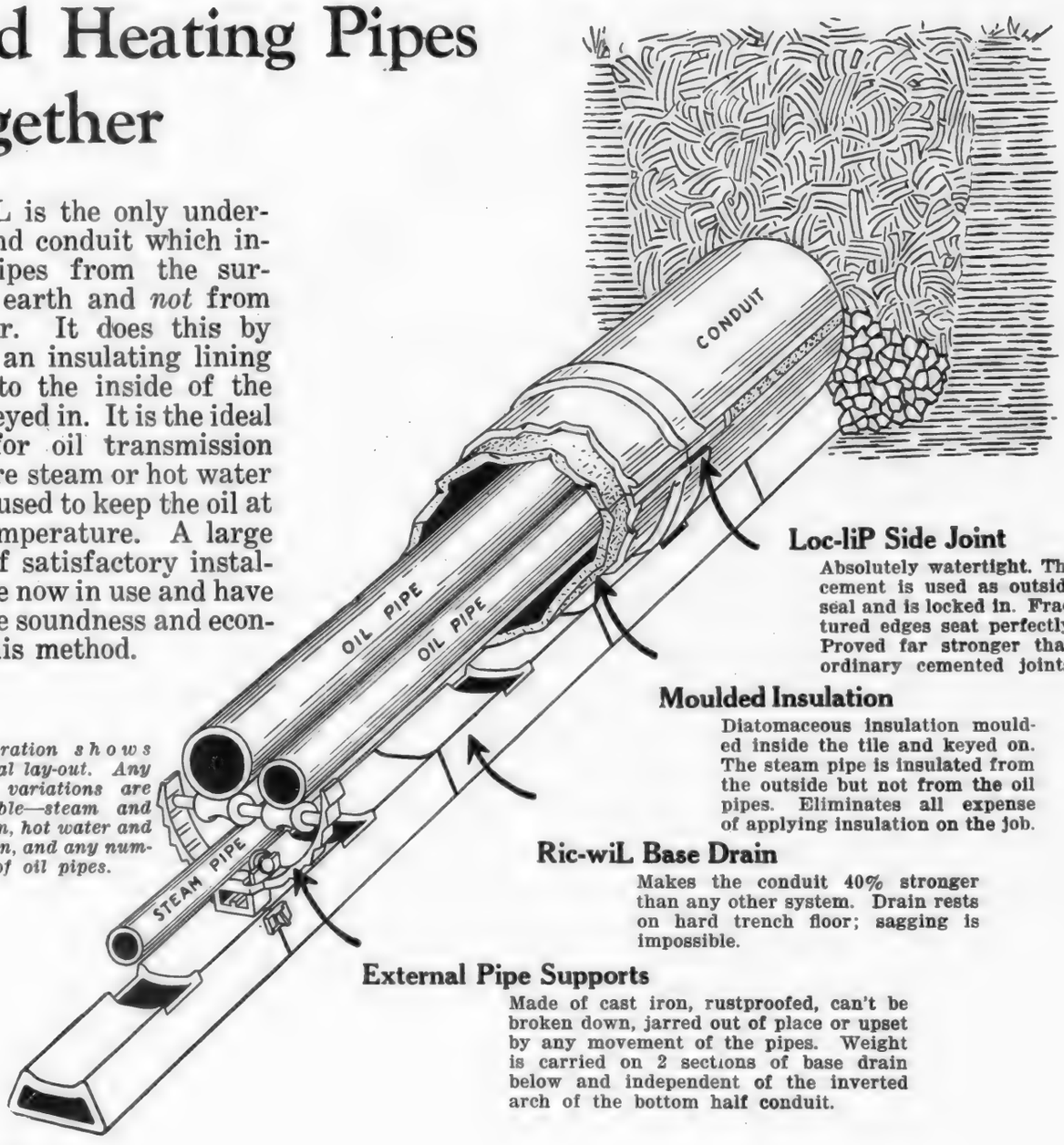

Illustration shows typical lay-out. Any pipe variations are possible—steam and return, hot water and return, and any number of oil pipes.

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Absolutely watertight. The cement is used as outside seal and is locked in. Fractured edges seat perfectly. Proved far stronger than ordinary cemented joints.

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EXHAUST HEADS.

Aeolus Dickinson Co., Chicago, Ill.
Illinois Engineering Co., Chicago, Ill.
Kieley & Mueller, Inc., New York.
McAlear Mfg. Co., Chicago, Ill.
Patterson-Kelley Co., New York.
Pecco, Inc., St. Louis, Mo.
Skinner Bros. Mfg. Co., St. Louis, Mo
Sturtevant Co., B. F., Hyde Park, Mass

EXHAUST SYSTEMS.

American Blower Co., Detroit, Mich.
Autovent Fan & Blower Co., Chicago, Ill.
Buckeye Blower Co., Columbus, O.
Buffalo Forge Co., Buffalo, N Y.
Ilg Electric Ventilating Co., Chicago, Ill.
Johnson Fan & Blower Co., Chicago, Ill.
Pecco, Inc., St. Louis, Mo.
Skinner Bros. Mfg. Co., St. Louis, Mo.
Sturtevant Co., B. F., Hyde Park, Mass.
Wing Mfg. Co., L. J., New York.
York Heating & Ventilating Co., Philadelphia, Pa

EXPANSION JOINTS.

American District Steam Co., No. Tonawanda, N. Y.
Badger & Sons Co., E. B., Boston, Mass.
Griscom-Russell Co., New York.
Hornung, J. C., Chicago, Ill.
Howard Iron Works, Buffalo, N. Y.
Illinois Engineering Co., Chicago, Ill.
Pearce & Co., W. H., Chicago, Ill.
Ric-Wil Co., Cleveland, O.
Ross Heater & Mfg. Co., Buffalo, N. Y.
Webster & Co., Warren, Camden, N. J.
Wheeler Condenser & Engineering Co., Carteret, N. J.

EXPANSION SHELLS

Phillips Drill Co., Chicago, Ill.

FANS, EXHAUST.

Amercan Blower Co., Detroit, Mich.
Autovent Fan & Blower Co., Chicago, Ill.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Buckeye Blower Co., Columbus, O.
Buffalo Forge Co., Buffalo, N. Y.
Clarage Fan Co., Kalamazoo, Mich.
DeBothezat Impeller Co., Inc., New York.
Ilg Electric Ventilating Co., Chicago, Ill.
Johnson Fan & Blower Co., Chicago, Ill.
New York Blower Co., Chicago, Ill.
Pecco, Inc., St. Louis, Mo.
Seymour, James M., Newark, N. J.
Skinner Bros. Mfg. Co., St. Louis, Mo.
Sturtevant Co., B. F., Hyde Park, Mass.
Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa.
L. J. Wing Mfg. Co., New York.
York Heating & Ventilating Co., Philadelphia, Pa.

FEEDERS

Boiler

Cashin Co., W. D., Boston, Mass.
Cissell Mfg. Co., W. M., Louisville, Ky.
Kieley & Mueller, Inc., New York.
McAlear Mfg. Co., Chicago, Ill.
McDonnell & Miller, Chicago, Ill.

FILTERS, (Aerating).

Davis Engineering Corp., New York.
Griscom-Russell Co., New York.

Feed-Water.

Davis Engineering Co., New York.
Ross Heater & Mfg. Co., Buffalo, N. Y.

FITTINGS, FLANGED.

American District Steam Co., No. Tonawanda, N. Y.
Clow and Sons, Jas. B., Chicago, Ill.
Grinnell Company, Providence, R. I.

FLANGES.

American District Steam Co., No. Tonawanda, N. Y.
Jenkins Bros., New York.

GAS BURNERS

Cleveland Gas Burner & Appliance Co., Cleveland, Ohio.

GASKETS, METALLIC.

Sarco Co., New York.

GAUGE BOARDS.

American Schaeffer & Budenberg Corp., Brooklyn, N. Y.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Bristol Co., Waterbury, Conn.
Foxboro Co., Inc., The, Foxboro, Mass.
McAlear Mfg. Co., Chicago, Ill.
Marsh & Co., Jas. P., Chicago, Ill.
Webster & Co., Warren, Camden, N. J.

GAUGES.

Altitude

Federal Gauge Company, Chicago, Ill.
Pierce, Butler & Pierce Mfg. Co., New York.

Draft.

American Schaeffer & Budenberg Corp., Brooklyn, N. Y.
Foxboro Co., Inc., The, Foxboro, Mass.
Marsh & Co., Jas. P., Chicago, Ill.

Hydraulic.

American Schaeffer & Budenberg Corp., Brooklyn, N. Y.
Federal Gauge Company, Chicago, Ill.
Foxboro Co., Inc., The, Foxboro, Mass.
Marsh & Co., Jas. P., Chicago, Ill.

Ounce Graduated.

Federal Gauge Company, Chicago, Ill.
Marsh & Co., Jas. P., Chicago, Ill.
O-E Specialty Co., Milwaukee, Wis.

Pressure.

American Dist. Steam Co., North Tonawanda, N. Y.
American Schaeffer & Budenberg Corp., Brooklyn, N. Y.
Bristol Co., Waterbury, Conn.
Federal Gauge Company, Chicago, Ill.
Foxboro Co., Inc., The, Foxboro, Mass
Marsh & Co., Jas. P., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
O-E Specialty Mfg. Co., Milwaukee, Wis.
Pierce, Butler & Pierce Mfg. Co., New York.
Webster & Co., Warren, Camden, N. J.

Vacuum.

American Schaeffer & Budenberg Corp., Brooklyn, N. Y.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Bristol Co., Waterbury, Conn.
Federal Gauge Company, Chicago, Ill.
Foxboro Co., Inc., The, Foxboro, Mass.
Marsh & Co., Jas. P., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
Pierce, Butler & Pierce Mfg. Co., New York.
Webster & Co., Warren, Camden, N. J.

Vacuum (Compound).

Cashin Co., W. D., Boston, Mass.
Federal Gauge Company, Chicago, Ill.
Pierce, Butler & Pierce Mfg. Co., New York.

Water.

American District Steam Co., No. Tonawanda, N. Y.
American Schaeffer & Budenburg Corp., Brooklyn, N. Y.
Bristol Co., Waterbury, Conn.
Jenkins Bros., New York.

GENERATOR COOLING SYSTEMS.

Badger & Sons Co., E. B., Boston, Mass.
Carrier Air Conditioning Co., of America, Buffalo, N. Y.
Cooling Tower Co., New York.
Spray Engineering Co., Boston, Mass.
Sturtevant Co., B. F., Hyde Park, Mass.

GOVERNORS, (Pump).

Atlas Valve Co., Newark, N. J.
Davis Regulator Co., G. M., Chicago, Ill.
Illinois Engineering Co., Chicago, Ill.
Kieley & Mueller, Inc., New York.
Klipfel Mfg. Co., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
Mason Regulator Co., Boston, Mass.
Stickle Steam Specialties Co., Indianapolis, Ind.
Westinghouse Elec. &. Mfg. Co., East Pittsburgh, Pa.

GRATES

Dumping

Pyramid Iron Products Co., New York.

Rocking

Pyramid Iron Products Co., New York.

Shaking

Pyramid Iron Products Co., New York.

Shaking and Dumping

Pyramid Iron Products Co., New York.

Shaking, Circular

Pyramid Iron Products Co., New York.

Stationary

Pyramid Iron Products Co., New York.

HEAT CABINETS

Trane Co., LaCross, Wis.

HEATERS.

Domestic Water.

Alberger Heater Co., Buffalo, N. Y.
American District Steam Co., No. Tonawanda, N. Y.
American Radiator Co., Chicago, Ill.
Badger & Sons Co., E. B., Boston, Mass.
Bell & Gossett Co., Chicago, Ill.
Burnham Boiler Corp., Irvington, N. Y.
Davis Engineering Co., New York.
Excelso Specialty Works, Buffalo, N. Y.
Frank Heating & Engineering Co., O. E., Buffalo, N. Y.
Monitor Boiler Co., Philadelphia, Pa.
National Pipe Bending Co., New Haven, Conn.
Page Boiler Co., Wm. H., New York.
Patterson-Kelley Co., New York.
Pierce, Butler & Pierce Mfg. Co., New York.
Ross Heater & Mfg. Co., Buffalo, N. Y.
Sims Co., Erie, Pa.
Spencer Heater Co., Williamsport, Pa.
Thermal Appliance Co., New York.
Whitlock Coil Pipe Co., Hartford, Conn.

Electrical Unit

Ilg Electric Ventilating Co., Chicago, Ill.

Feed Water, (Closed).

Alberger Heater Co., Buffalo, N. Y.
Davis Engineering Co., New York.
Frank Heating & Engineering Co., O. E., Buffalo, N. Y.
Griscom-Russell Co., New York.
McAlear Mfg. Co., Chicago, Ill.
National Pipe Bending Co., New Haven, Conn.
Patterson-Kelley Co., New York.
Ross Heater & Mfg. Co., Buffalo, N. Y.
Sims Co., Erie, Pa.
Wheeler Condenser & Engineering Co., Carteret, N. J.
Whitlock Coil Pipe Co., Hartford, Conn.

Feed Water, (Open).

Griscom-Russell Co., New York.
Sims Co., Erie, Pa.
Stickle Steam Specialties Co., Indianapolis, Ind.
Webster & Co., Warren, Camden, N. J.

Fuel-oil.

Alberger Heater Co., Buffalo, N. Y.
American Blower Co., Detroit, Mich.
Davis Engineering Corp., New York.
Drying Systems, Inc., Chicago, Ill.
Griscom-Russell Co., New York.
National Pipe Bending Co., New Haven, Conn.
Ross Heater & Mfg. Inc., Buffalo, N. Y.
Whitlock Coil Pipe Co., Hartford, Conn.

Air, Fan System.

Aerofin Corporation, Newark, N. J.
American Blower Co., Detroit, Mich.
American Radiator Co., Chicago, Ill.
Autovent Fan & Blower Co., Chicago, Ill.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Buckeye Blower Co., Columbus, O.
Buffalo Forge Co., Buffalo, N. Y.
Clarage Fan Co., Kalamazoo, Mich.
Drying Systems, Inc., Chicago, Ill.
Johnson Fan & Blower Co., Chicago, Ill.
Modine Mfg. Co., Racine, Wis.
New York Blower Co., Chicago, Ill.
Peerless Unit Ventilation Co., Inc., Long Island City, N. Y.
Sturtevant Co., B. F., Hyde Park, Mass.

Magazine Feed

Spencer Heater Co., Williamsport, Pa.

Portable Unit Air.

American Blower Co., Detroit, Mich.
Autovent Fan & Blower Co., Chicago, Ill.
Buffalo Forge Co., Buffalo, N. Y.
Dwyer Equipment Co., Chicago, Ill.
Ilg Electric Ventilating Co., Chicago, Ill.
Mueller Furnace Co., L. J., Milwaukee, Wis.
Pecco Incorporated, St. Louis, Mo.
Skinner Bros. Co., St. Louis, Mo.
Sturtevant Co., B. F., Hyde Park, Mass.
L. J. Wing Mfg. Co., New York.
York Heating & Ventilating Co., Philadelphia, Pa
(See also Ventilators, Portable Unit.)

HEATING SYSTEMS.

"Gasteam".

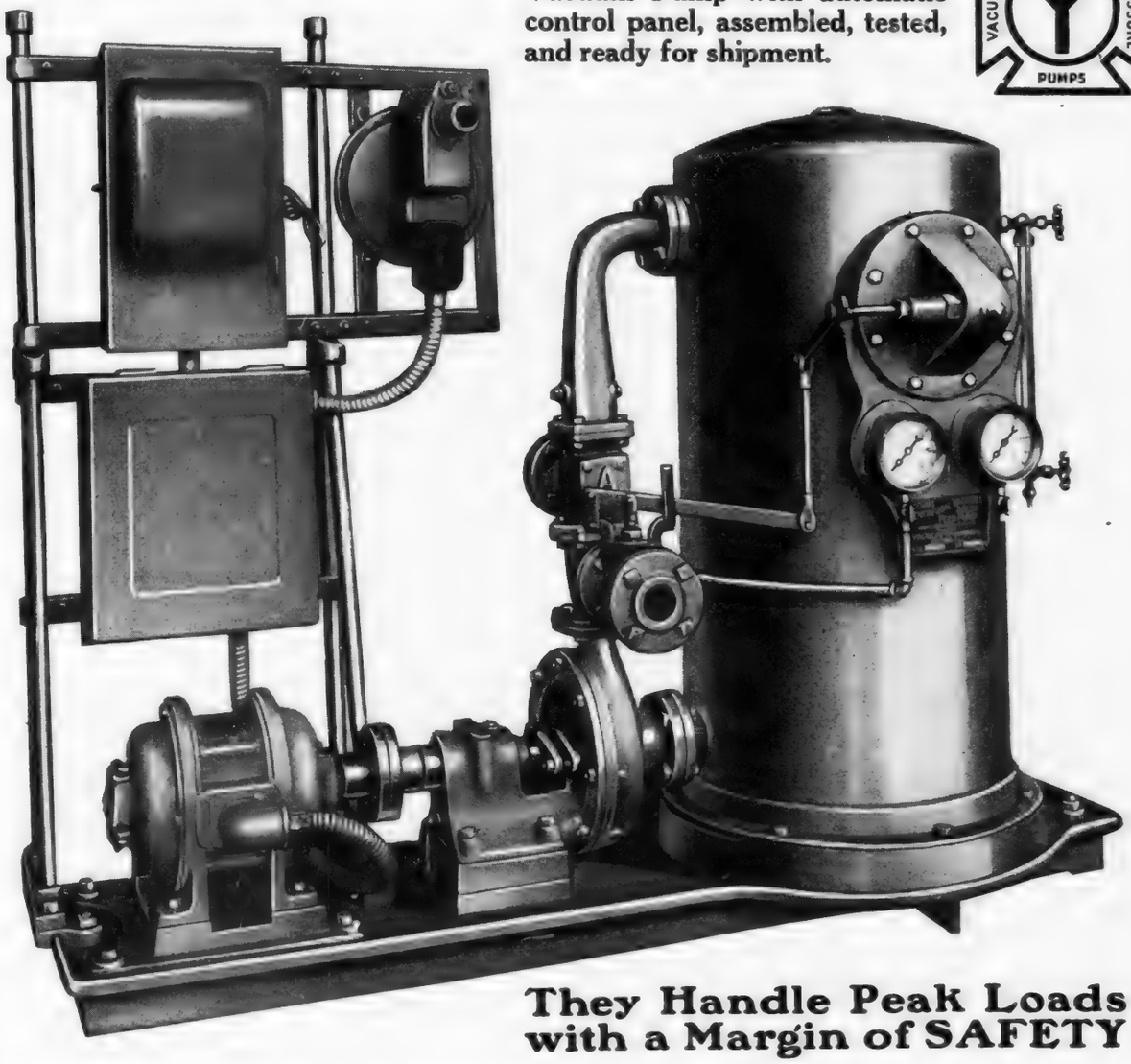
James B. Clow & Sons, Chicago, Ill.

Vacuum.

Barnes & Jones, Boston, Mass.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Cashin Co., W. D., Boston, Mass.
Dunham Co., C. A., Chicago, Ill.
Illinois Engineering Co., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
Marsh & Co., Jas. P., Chicago, Ill.
O-E Specialty Co., Milwaukee, Wis.
Sarco Co., New York.
Spencer Heater Co., Williamsport, Pa.
Sterling Engineering Co., Milwaukee, Wis.
Stickle Steam Specialties Co., Indianapolis, Ind
Webster & Co., Warren, Camden, N. J.

YOUNG CENTRIFUGAL VACUUM AND BOILER FEED PUMPS

Standard assembly of Young Vacuum Pump with automatic control panel, assembled, tested, and ready for shipment.



They Handle Peak Loads with a Margin of SAFETY

THERE is never any danger of stalling a Young Pump regardless of the amount of condensation returning from the system. Young Pumps have motors large enough to discharge water four times faster than the normal flow of condensation from a system of rated capacity. Yet there is no waste in power because the pump unloads the motor as the condensation rate decreases. This wide margin of safety is important when handling peak loads such as occur when steam is first turned into a cold system when the condensation rate is exceptionally heavy.

The Young Pump with its one moving element creates a powerful suction on the return lines and maintains a positive pressure of twenty pounds available to discharge water to the boiler. This accounts for the marked efficiency and low power consumption of the pump.

An important Young feature is the selection of an automatic control best suited to meet the actual need of the system. Other features are simplicity of construction, accessibility, low power consumption and ease of installation.

Supplied in Standard Units of Seven Capacities

YOUNG PUMP COMPANY
DUNHAM BUILDING
450 E. Ohio St., Chicago
Factory: Michigan City, Ind.

In Canada: C. A. Dunham Co., Ltd.
1523-41 Davenport Road
Toronto

ENGINEERS' SPECIFICATION INDEX (Continued)

Vapor.

American District Steam Co., No. Tonawanda. N. Y.
Barnes & Jones, Boston, Mass.
Cashin Co., W. D., Boston, Mass.
Dunham Co., C. A., Chicago, Ill.
Gorton & Lidgerwood Co., New York.
Grinnell Company, Providence, R. I.
Haines & Co., Wm. S., Philadelphia, Pa.
Ideal Heating Equip. Co., Cleveland, Ohio.
Illinois Engineering Co., Chicago, Ill.
Illinois Malleable Iron Co., Chicago, Ill.
Marsh & Co., Jas. P., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
Mouat Vapor Heating Co., Cleveland, O.
Nelson Corporation, Herman, Moline, Ill.
O-E Specialty Mfg. Co., Milwaukee, Wis.
Sarco Co., New York.
Simplex Heating Specialty Co., Inc., Lynchburg, Va.
Spencer Heater Co., Williamsport, Pa.
Sterling Engineering Co., Milwaukee, Wis.
Trane & Co., La Crosse, Wis.
Vapor Engineering Co., New York.
Webster & Co., Warren, Camden, N. J.

Water.

Grinnell Company, Providence, R. I.
Patterson-Kelley Co., New York.
Spencer Heater Co., Williamsport, Pa.
Thrush & Co., H. A., Peru, Ind.

HUMIDIFIERS

American Blower Co., Detroit, Mich.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Carrier Air Conditioning Co., of America, Buffalo, N. Y.
Carrier Engineering Corporation, Newark, N. J.
Drying Systems, Inc., Chicago, Ill.
Grinnell Company, Providence, R. I.
New York Blower Co., Chicago, Ill.
Seymour, James M., Newark, N. J.
Sturtevant Co., B. F., Hyde Park, Mass.

HUMIDITY CONTROL.

American Blower Co., Detroit, Mich.
Atlas Valve Co., Newark, N. J.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Carrier Air Conditioning Co., of America, Buffalo, N. Y.
Carrier Engineering Corp., Newark, N. J.
Drying Systems, Inc., Chicago, Ill.
Foxboro Co., Inc., The Foxboro, Mass.
Grinnell Company, Providence, R. I.
Klipfel Mfg. Co., Chicago, Ill.
New York Blower Co., Chicago, Ill.
Powers Regulator Co., Chicago, Ill.
Sturtevant Co., B. F., Hyde Park, Mass.

INSTRUMENTS

Electric Measuring.

Bristol Co., Waterbury, Conn.
Westinghouse Electric & Mfg. Co., East Pittsburg, Pa.

Indicating and Recording.

American Schaeffer & Budenberg Corp., Brooklyn, N. Y.
Bristol Co., Waterbury, Conn.
Bailey Meter Co., Cleveland, O.
Foxboro Co., Inc., The Foxboro, Mass
Marsh & Co., Jas. P., Chicago, Ill.
Sarco Co., New York
Westinghouse Elec. & Mfg. Co., East Pittsburg, Pa

INSULATING MATERIALS.

American District Steam Co., No. Tonawanda, N. Y.
Hornung, J. C., Chicago, Ill.
Johns-Manville, Inc., New York.
Minwool Insulating Co., Toledo, Ohio.
Pearce & Co., W. H., Chicago, Ill.
Ric-Wil Co., Cleveland, O.
Universal Gypsum & Lime Co., Chicago, Ill.
Wyckoff & Sons, A., Elmira, N. Y.

MANOMETERS.

American Schaeffer & Budenberg Corp., Brooklyn, N. Y.

MECHANICAL DRAFT APPARATUS.

American Blower Co., Detroit, Mich.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Buckeye Blower Co., Columbus, O.
Clarage Fan Co., Kalamazoo, Mich.
New York Blower Co., Chicago, Ill.
Sturtevant Co., B. F., Hyde Park Mass.
L. J. Wing Co., New York.

METERS.

Condensation.

American Dist. Steam Co., No. Tonawanda, N. Y.
Hornung, J. C., Chicago, Ill.
Pearce & Co., W. H., Chicago, Ill.

Feed Water.

Feed Water (Wier Type).

Webster & Co., Warren, Camden, N. J.

Flow

American District Steam Co., North Tonawanda, N. Y.
Spray Engineering Co., Boston, Mass.

Pitot Tube.

American Blower Co., Detroit, Mich.

Steam.

American District Steam Co., No. Tonawanda, N. Y.
Foxboro Co., Inc., The Foxboro, Mass.

MOTORS (Electric).

Century Electric Co., St. Louis, Mo.
Janette Mfg. Co., Chicago, Ill.
Lincoln Electric Company, Cleveland, Ohio
Sturtevant Co., B. F., Hyde Park, Mass.
Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa.

NOZZLES, SPRAY

American Blower Co., Detroit, Mich.
Badger & Sons Co., E. B., Boston, Mass.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Carrier Air Conditioning Co. of America, Buffalo, N. Y.
Carrier Engineering Co., Newark, N. J.
Clarage Fan Co., Kalamazoo, Mich.
Cooling Tower Co., New York
New York Blower Co., Chicago, Ill.
Spray Engineering Co., Boston, Mass.
Sturtevant Co., B. F., Hyde Park, Mass.

OIL BURNERS

Aetna Automatic Oil Burner, Inc., Providence, R. I.
American Nokol Co., Chicago, Ill.
Automatic Burner Corp., Chicago, Ill.
Chalmers Oil Burner Co., Minneapolis, Minn.
Crosley Radio Corp., Cincinnati, Ohio.
Drying Systems, Inc., Chicago, Ill.
Electrol Incorporated, St. Louis, Mo.
Hardinge Bros., Inc., Chicago, Ill.
Johnson Co., S. T., Oakland, Cal.
May Oil Burner Corp., Baltimore, Md.
Nu-Way Corporation, Rock Island, Ill.
Petroleum Heat and Power Co., New York.
Rayfield Mfg. Co., Chicago, Ill.
Sunstrand Engineering Co., Rockford, Ill.
Sword & Kimber, Phila., Pa.
Wilde Co., W. B., Peoria, Ill.

OIL BURNER EQUIPMENT

Absolute Con-Tac-Tor Corp., Beloit, Wis.
Janette Mfg. Co., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
McDonnell & Miller, Chicago, Ill.
Minneapolis Heat Regulator Co., Minneapolis, Minn.
Monroe Machine Tool Co., Chicago, Ill.
Webster Electric Co., Racine, Wis.

Ignition

Webster Electric Co., Racine, Wis.

OZONE APPARATUS.

Air Conditioning & Engineering Co., St. Louis, Mo.

PIPE.

Cast Iron.

Clow & Sons, Jas. B., Chicago, Ill.

Steel.

National Tube Co., Pittsburgh, Pa.

Wood.

Wyckoff & Sons Co., A., Elmira, N. Y.

PIPE BENDING.

Badger & Sons Co., E. B., Boston, Mass.
Buffalo Forge Co., Buffalo, N. Y.
Grinnell Company, Providence, R. I.
National Pipe Bending Co., New Haven, Conn.
Whitlock Coil Pipe Co., Hartford, Conn.

PIPE CASING (Wood).

American District Steam Co., No. Tonawanda, N. Y.
Wyckoff & Sons Co., A., Elmira, N. Y.

PIPE HANGERS.

Grinnell Company, Providence, R. I.
Jenkins Bros., New York.

PIPE, POWER.

Grinnell Company, Providence, R. I.

PIPE THREADING & CUTTING MACHINES

Standard Engineering Co., Ellwood City, Pa.

PUMPS.

Centrifugal.

American Steam Pump Co., Battle Creek, Mich.
Buffalo Steam Pump Co., Buffalo, N. Y.
Chicago Pump Co., Chicago, Ill.
Economy Pumping Machinery Co., Chicago, Ill
Nash Engineering Co., So. Norwalk, Conn.
Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa.
Wheeler Condenser & Engineering Co., Carteret, N. J.
Yeomans Bros. Co., Chicago, Ill.
Young Pump Co., Michigan City, Ind.

Condensation.

American Steam Pump Co., Battle Creek, Mich.
Buffalo Steam Pump Co., Buffalo, N. Y.
Chicago Pump Co., Chicago, Ill.
Economy Pumping Machinery Co., Chicago, Ill.
Yeomans Bros. Co., Chicago, Ill.

Rotary.

Nash Engineering Co., So. Norwalk, Conn.

Steam.

American Steam Pump Co., Battle Creek, Mich.
Buffalo Steam Pump Co., Buffalo, N. Y.
Nash Engineering Co., So. Norwalk, Conn.

Turbine.

Nash Engineering Co., So. Norwalk, Conn.
Wheeler Condenser & Engineering Co., Carteret, N. J.
Yoemans Bros., Chicago, Ill.

Vacuum.

American Steam Pump Co., Battle Creek, Mich.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Chicago Pump Co., Chicago, Ill.
Economy Pumping Machinery Co., Chicago, Ill.
Janette Mfg. Co., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
Nash Engineering Co., So. Norwalk, Conn
Ross Heater & Mfg. Co., Inc., Buffalo, N. Y.
Skidmore Corp., Chicago, Ill.
Trane Co., La Crosse, Wis.
Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.
Yeomans Bros., Chicago, Ill.
Young Pump Co., Michigan City, Ind.

RADIATOR HANGERS.

Gloeckle, Jr., A. F., Rochester, N. Y.
Grinnell Company, Providence, R. I.
Hartmann Co., Charles, Brooklyn, N. Y.
Healy-Ruff Company, St. Paul, Minn.
Little Giant Mfg. Co., Minneapolis, Minn.
Pierce, Butler & Pierce Mfg. Co., New York.

RADIATORS.

"Gasteam."

James B. Clow & Sons, Chicago, Ill.

"Gaswater."

Clow & Sons, Jas. B., Chicago, Ill.

RADIATORS, STEAM AND WATER.

Aerofin Corp., Newark, N. J.
American Radiator Co., Chicago, Ill.
International Heater Co., Utica, N. Y.
Gurney Heater Mfg. Co., Boston, Mass.
National Radiator Co., Johnstown, Pa.
Pierce, Butler & Pierce Mfg. Co., New York.
Spencer Heater Co., Williamsport, Pa.
United States Radiator Corp., Detroit, Mich.

RECEIVERS.

Air.

American District Steam Co., No. Tonawanda, N. Y.
The Brownell Co., Dayton, Ohio.
Kieley & Mueller, Inc., New York.
Sterling Engineering Co., Milwaukee, Wis.

Condensation.

Chicago Pump Co., Chicago, Ill.
Davis Regulator Co., G. M., Chicago, Ill.
Economy Pumping Machinery Co., Chicago, Ill
McAlear Mfg. Co., Chicago, Ill.
Yeomans Bros., Chicago, Ill.

REGULATORS.

Boiler-Feed.

Kieley & Mueller, Inc., New York.
McAlear Mfg. Co., Chicago, Ill.
McDonnell & Miller, Chicago, Ill.

Damper.

American Dist. Steam Co., No. Tonawanda, N. Y.
Atlas Valve Co., Newark, N. J.
American Radiator Co., Chicago, Ill.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Davis Regulator Co., G. M., Chicago, Ill.
Fulton Co., Knoxville, Tenn.
Honeywell Heating Specialties Co., Wabash, Indiana.
Kieley & Mueller, Inc., New York.
McAlear Mfg. Co., Chicago, Ill.
Mueller Co., Decatur, Ill.
National Regulator Co., Chicago, Ill.
Nelson Corporation, Herman, Moline, Ill.
O-E Specialty Mfg. Co., Milwaukee, Wis.
Powers Regulator Co., Chicago, Ill.
Simplex Heating Specialty Co., Inc., Lynchburgh, Va.
Sterling Engineering Co., Milwaukee, Wis.
Stickle Steam Specialties Co., Indianapolis, Ind.
Thrush & Co., H. A., Peru, Ind.
Trane Co., La Crosse, Wis.
L. J. Wing Mfg. Co., New York.
Atlas Valve Co., Newark, N. J.
Davis Regulator Co., G. M., Chicago, Ill.
Foxboro Co., Inc., The Foxboro, Mass.
Fulton Co., Knoxville, Tenn.
Honeywell Heating Specialties Co., Wabash, Indiana.

Reduce That Enormous Coal Bill

Use a Chicago "Sure Return"

Chicago Pump Company's "Sure Return" Condensation Pump and Receiver units are designed to take the returns from the radiation and pump it back to the boiler hot. The result is a quickened circulation that greatly increases the efficiency of the heating plant, thus effecting a great saving in the coal bill.

It is electrically driven and automatic in operation. All parts in this unit are of the highest grade obtainable and are standard and interchangeable.

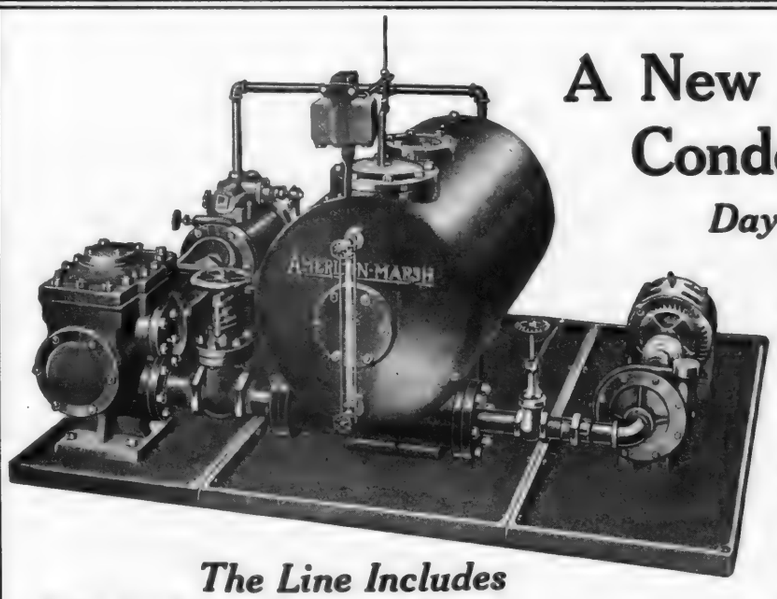
It is more compact, takes up less floor space, and requires less attention than any other on the market. For pressures up to 10 lbs. and capacities up to 10,000 square feet of direct radiation this unit is unequaled.

Quantity production manufacture makes the Chicago "Sure Return" units unusually **Low in Price.** A **24 Hour Delivery** can also be assured. Would you be interested in Bulletin 131, or do you want data on larger units? Built up to 150,000 feet of radiation, boiler pressure to suit any job.

CHICAGO PUMP COMPANY

Circulating Sewage Condensation Bilge Fire House Vacuum Boiler Feed

OFFICE AND WORKS :: 2325 WOLFRAM STREET :: CHICAGO, ILLINOIS



A New American Marsh Condensation Pump

Day and Night Service

This new Condensation Pump is designed for use where there is a wide variation in steam pressure. When the steam pump stops operating because of lack of steam pressure a motor driven centrifugal pump, which is controlled automatically, keeps the return lines free from condensation. This is important, for it keeps the return lines clear and continues to operate until enough steam is generated to operate the steam pump. It is really a day and night pump. Practical, efficient and economical.

Write for Bulletin No. 58

The Line Includes

Boiler Feed Pumps—Vacuum Pumps.
Hot Water Circulating Pumps.
Sump or Bilge Pumps.
Condensation Pumps, steam and motor driven, vertical and horizontal.
Automatic Boiler Feed Pumps and Receivers.

AMERICAN STEAM PUMP COMPANY

BATTLE CREEK, MICHIGAN

CHICAGO OFFICE: 926 Monadnock Block NEW YORK OFFICE: 17 Battery Place

ENGINEERS' SPECIFICATION INDEX (Continued)

Hornung, J. C., Chicago, Ill.
Illinois Engineering Co., Chicago, Ill.
Kieley & Mueller, Inc., New York.
McAlear Mfg. Co., Chicago, Ill.
Minneapolis Heat Regulator Co., Minneapolis, Minn.
National Regulator Co., Chicago, Ill.
Powers Regulator Co., Chicago, Ill.
Stickle Steam Specialties Co., Indiapapolis, Ind
Thrush & Co., H. A., Peru, Ind.

Temperature.

American Radiator Co., Chicago, Ill.
Atlas Valve Co., Newark, N. J.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Carrier Engineering Corporation, Newark, N. J
Foxboro Co., Inc., The Foxboro, Mass.
Fulton Co., Knoxville, Tenn.
Gold Car Heating & Lighting Co., Brooklyn,
Honeywell Heating Specialties Co., Wabash, Indiana.
Hornung, J. C., Chicago, Ill.
Johnson Service Co., Milwaukee, Wis.
Kieley & Mueller, Inc., New York.
Klipfel Mfg. Co., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
Minneapolis Heat Regulator Co., Minneapolis, Minn.
National Regulator Co., Chicago, Ill.
Powers Regulator Co., Chicago, Ill.
Sarco Co., New York.

SEPARATORS.

Oil.

Griscom-Russell Co., New York.
Illinois Engineering Co., Chicago, Ill.
Kieley & Mueller, Inc., New York.
Stickle Steam Specialties Co., Indianapolis, Ind

Steam.

American District Steam Co., No. Tonawanda, N. Y.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Griscom-Russell Co., New York.
Illinois Engineering Co., Chicago, Ill
McAlear Mfg. Co., Chicago, Ill.
Patterson-Kelley Co., New York.
Sims Co., Erie, Pa.
Stickle Steam Specialties Co., Indianapolis, Ind
Webster & Co., Warren, Camden, N. J.

SPRAY COOLING SYSTEMS.

Badger & Sons Co., E. B., Boston, Mass.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Cooling Tower Co., New York.
Seymour, James M., Newark, N. J.

SPRAY NOZZLES

(See Nozzles, Spray)

STOKERS

CoKal Stoker Corporation, Chicago, Ill.

STRAINERS.

Oil.

Griscom-Russell Co., New York.
Kieley & Mueller, Inc., New York.
Monroe Machine Tool Co., Chicago, Ill.
Ross Heater & Mfg. Co., Inc., Buffalo, N. Y

Steam.

American Dist. Steam Co., No. Tonawanda, N. Y.
Dunham Co., C. A., Chicago, Ill.
Illinois Engineering Co., Chicago, Ill.
Kieley & Mueller, Inc., New York.
Mason Regular Co., Boston, Mass.
McAlear Mfg. Co., Chicago, Ill.
Sarco Co., New York.
Sterling Engineering Co, Milwaukee, Wis.

Water.

American Dist. Steam Co., No. Tonawanda, N. Y.
Davis Regulator Co., G. M., Chicago, Ill.
Griscom-Russell Co., New York.
Illinois Engineering Co., Chicago, Ill.
Kieley & Mueller, Inc., New York.
McAlear Mfg. Co., Chicago, Ill.
Mason Regulator Co., Boston, Mass.
Ross Heater & Mfg. Co., Inc., Buffalo, N. Y
Sarco Co., New York.
Spray Engineering Co., Boston, Mass.

THERMOMETERS.

(Recording and Indicating).

American Schaeffer & Budenberg Corp., Brooklyn, N. Y.
Bristol Co., Waterbury, Conn.
Foxboro Co., Inc., The Foxboro, Mass.
Powers Regulator Co., Chicago, Ill.
Sarco Co., New York.

Water.

Marsh & Co., Jas. P., Chicago, Ill.
Pierce, Butler & Pierce Mfg. Co., New York.

THERMOSTATS.

Absolute Con-Tac-Tor Corp., Beloit, Wis.
American Radiator Co., Chicago, Ill.
Atlas Valve Co., Newark, N. J.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Federal Gauge Co., Chicago, Ill.
Fulton Co., Knoxville, Tenn.
Gold Car Heating & Lighting Co., Brooklyn
Honeywell Heating Specialties Co., Wabash Indiana.
Johnson Service Co., Milwaukee, Wis.
Klipfel Mfg. Co., Chicago, Ill.
Minneapolis Heat Regulator Co., Minneapolis, Minn.
Powers Regulator Co., Chicago, Ill.
Sarco Co., New York.
Thrush & Co., H. A., Peru, Ind.

TRAPS.

Radiator.

Barnes & Jones, Boston, Mass.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Cashin Co., W. D. Boston, Mass.
Dunham, C. A., Co., Chicago, Ill.
Hoffman Specialty Co., New York.
Ideal Heating Equipment Co., Cleveland, Ohio.
Illinois Engineering Co., Chicago, Ill.
Johns-Manville, Inc., New York.
McAlear Mfg. Co., Chicago, Ill.
Marsh & Co., Jas. P., Chicago, Ill.
Milwaukee Valve Co., Milwaukee, Wis.
Mouat Vapor Heating Co., Cleveland, O.
Nelson Corporation, Herman, Moline, Ill.
O-E Specialty Co., Milwaukee, Wis.
Russell & Co., W. A. New York.
Sarco Co., New York.
Sterling Engineering Co., Milwaukee, Wis.
Stickle Steam Specialties Co., Indianapolis, Ind.
Trane Co., La Crosse, Wis.
Webster & Co., Warren, Camden, N. J.

Return.

American Blower Co., Detroit, Mich.
Barnes & Jones, Boston, Mass.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Cashin Co., W. D., Boston, Mass.
Dunham Co., C. A., Chicago, Ill.
Illinois Engineering Co., Chicago Ill.
Johns-Manville, Inc., New York.
Kieley & Mueller, Inc., New York.
Lytton Manufacturing Co., Franklin, Va.
Marsh & Co., Jas. P., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
Mouat Vapor Heating Co., Cleveland, O.
O-E Specialty Mfg. Co., Milwaukee, Wis.
Simplex Heating Specialty Co., Inc., Lynchburgh, Va.
Sterling Engineering Co., Milwaukee, Wis.
Trane Co., La Crosse, Wis.
Webster & Co., Warren, Camden, N. J.

Steam.

American Blower Co., Detroit, Mich.
American District Steam Co., No. Tonawanda, N. Y.
American Schaeffer & Budenberg Corp., Brooklyn, N. Y.
Barnes & Jones, Boston, Mass.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Davis Engineering Co., New York.
Davis Regulator Co., G. M., Chicago, Ill.
Dunham Co., C. A., Chicago, Ill.
Haines & Co., Wm. S., Philadelphia, Pa.
Hoffman Specialty Co., New York.
Illinois Engineering Co., Chicago, Ill.
Jenkins Bros., New York.
Johns-Manville, Inc., New York.
Kieley & Mueller, Inc., New York.
Klipfel Mfg. Co., Chicago, Ill.
Lytton Manufacturing Co., Franklin, Va.
Marsh & Co., Jas. P., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
Patterson-Kelley Co., New York.
Pearce & Co., W. H., Chicago, Ill.
Powers Regulator Co., Chicago, Ill.
Russell & Co., W. A. New York.
Sarco Co., New York.
Stickle Steam Specialties Co., Indianapolis, Ind.
Trane Co., La Crosse, Wis.

Vacuum.

American Blower Co., Detroit, Mich.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Cashin Co., W. D., Boston, Mass.
Dunham Co., C. A., Chicago, Ill.
Hoffman Specialty Co., New York.
Illinois Engineering Co., Chicago, Ill.
Kieley & Mueller, Inc., New York.
Lytton Manufacturing Co., Franklin, Va.
Marsh & Co., Jas. P., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
O-E Specialty Mfg. Co., Milwaukee, Wis.
Pearce & Co., W. H., Chicago, Ill.
Russell & Co., W. A. New York.
Sarco Co., New York.
Sterling Engineering Co., Milwaukee, Wis.
Stickle Steam Specialties Co., Indianapolis, Ind
Webster & Co., Warren, Camden, N. J.

TURBINES (Steam).

Buffalo Forge Co., Buffalo, N. Y.
Sturtevant Co., B. F., Hyde Park, Mass.
Westinghouse Elec. & Mfg. Co. East Pittsburgh, Pa.
L. J. Wing Mfg. Co., New York.

TURBO-BLOWERS.

Sturtevant Co., B. F., Hyde Park, Mass.
Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa.

UNDERGROUND PIPE CONDUITS.

American District Steam Co., No. Tonawanda, N. Y.
Hornung, P. C., Chicago, Ill.
Johns-Manville, Inc., New York
Pearce & Co., W. H., Chicago, Ill.
Ric-Wil Co., Cleveland, O.
Wyckoff & Son, A., Elmira, N. Y

VACUUM CLEANING APPARATUS.

American Radiator Co., Chicago, Ill.
Spencer Turbine Co., Hartford, Conn.
Sturtevant Co., B. F., Hyde Park, Mass.

VALVES.

Air (Automatic).

American Radiator Co., Chicago, Ill.
Commonwealth Brass Corporation, Detroit, Mich.
Fulton Co., Knoxville, Tenn.
Haines & Co., Wm. S., Philadelphia, Pa.
Hoffman Specialty Co., New York.
Jenkins Bros., New York.
Kelley Brass Works, Chicago, Ill.
Marsh & Co., Jas. P., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
Milwaukee Valve Co., Milwaukee, Wis.
O-E Specialty Mfg. Co., Milwaukee, Wis.
Powers Regulator Co., Chicago, Ill.
Pierce, Butler & Pierce Corp., New York.

Air Relief.

American District Steam Co., No. Tonawanda N. Y.
American Schaeffer & Budenberg Corp., Brooklyn, N. Y.
Barnes & Jones, Boston, Mass.
Dunham Co., C. A., Chicago, Ill.
Fulton Co., Knoxville, Tenn.
Illinois Engineering Co., Chicago, Ill.
Jenkins Bros., New York.
Kieley & Mueller, Inc., New York.
McAlear Mfg. Co., Chicago, Ill.
O-E Specialty Co., Milwaukee, Wis.
Powell Co., Wm., Cincinnati, O.
Russell & Co., W. A. New York.
Scott Valve Mfg. Co., Detroit, Mich.
Sterling Engineering Co., Milwaukee, Wis.
Webster & Co., Warren, Camden, N. J.

Back Pressure.

Griscom-Russell Co., New York.
Illinois Engineering Co., Chicago, Ill.
Jenkins Bros., New York.
Kieley & Mueller, Inc., New York.
Klipfel Mfg. Co., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
Scott Valve Mfg. Co., Detroit, Mich.
Stickle Steam Specialties Co., Indianapolis, Ind.

Balanced.

American District Steam Co., No. Tonawanda, N. Y.
Atlas Valve Co., Newark, N. J.
Davis Regulator Co., G. M., Chicago, Ill.
Kieley & Mueller, Inc., New York.
Klipfel Mfg. Co., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
Powers Regulator Co., Chicago, Ill.
Scott Valve Mfg. Co., Detroit, Mich.
Stickle Steam Specialties Co., Indianapolis, Ind.

Blow-off.

Jenkins Bros., New York.
The Wm. Powell Co., Cincinnati, O.

Check.

Grinnell Company, Providence, R. I.
Jenkins Bros., New York.
Lytton Manufacturing Co., Franklin, Va.
O-E Specialty Mfg. Co., Milwaukee, Wis.
Powell Co., Wm., Cincinnati, O.
Scott Valve Mfg. Co., Detroit, Mich.

Float.

American Schaeffer & Budenberg Corp., Brooklyn, N. Y.
Atlas Valve Co., Newark, N. J.
Davis Regulator Co., G. M., Chicago, Ill.
Grinnell Company, Providence, R. I.
Illinois Engineering Co., Chicago, Ill.
Kieley & Mueller Co., New York.
Klipfel Mfg. Co., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
Mason Regulator Co., Boston, Mass.
Stickle Steam Specialties Co., Indianapolis, Ind.

Gate.

American District Steam Co., No. Tonawanda, N. Y.
Grinnell Company, Providence, R. I.
Jenkins Bros., New York.
Marsh Valve Co., Erie, Pa.
Milwaukee Valve Co., Milwaukee, Wis.
Powell Co., Wm., Cincinnati, O.
Scott Valve Mfg. Co., Detroit, Mich.

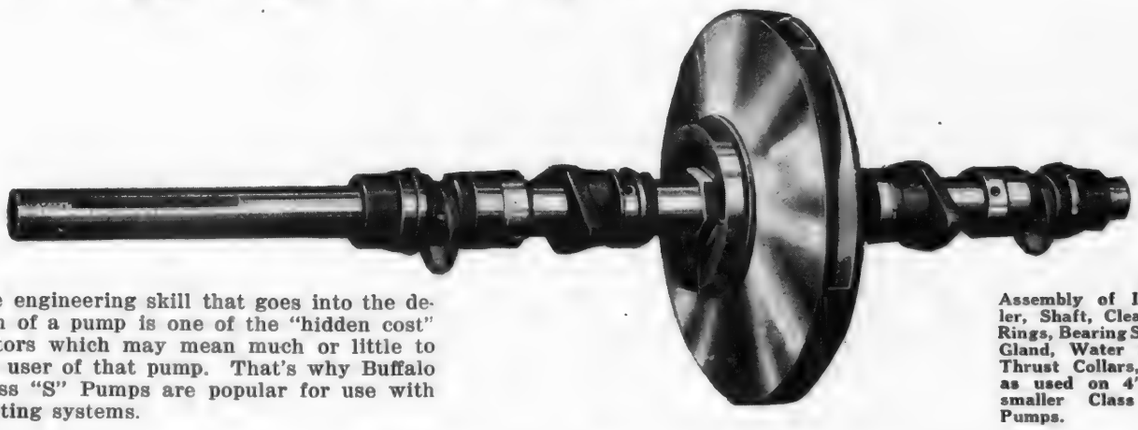
Globe, Angle and Cross.

Commonwealth Brass Corp., Detroit, Mich.
Grinnell Company, Providence, R. I.
Jenkins Bros., New York.
Marsh Valve Co., Erie, Pa.
Milwaukee Valve Co., Milwaukee, Wis.
Pierce, Butler & Pierce Corp., New York.
Powell Co., Wm., Cincinnati, O.
Powers Regulator Co., Chicago, Ill.
Scott Valve Mfg. Co., Detroit, Mich

Hydraulic-Operating.

Atlas Valve Co., Newark, N. J.
Kieley & Mueller, Inc., New York.

The "hidden cost" factor in a high grade pump—



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Non-Return.

American Schaeffer & Budenberg Corp., Brooklyn, N. Y.
Davis Regulator Co., G. M., Chicago, Ill.
Grinnell Company, Providence, R. I.
Jenkins Bros., New York.
Kieley & Mueller, Inc., New York.
McAlear Mfg. Co., Chicago, Ill.
Powell Co., Wm., Cincinnati, O.

Radiator.

American Radiator Co., Chicago, Ill.
American District Steam Co., No. Tonawanda, N. Y.
Atlas Valve Co., Newark, N. J.
Barnes & Jones, Boston, Mass.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Commonwealth Brass Corporation, Detroit, Mich.
Dunham Co., C. A., Chicago, Ill.
Fulton Co., Knoxville, Tenn.
Gorton & Lidgerwood Co., New York.
Honeywell Heating Specialties Co., Wabash, Indiana.
Ideal Heating Equip. Co., Cleveland, Ohio.
Illinois Engineering Co., Chicago, Ill
Jenkins Bros., New York.
McAlear Mfg. Co., Chicago, Ill.
Marsh & Co., Jas. P., Chicago, Ill.
Marsh Valve Co., Dunkirk, N. Y.
Milwaukee Valve Co., Milwaukee, Wis.
Powell Co., Wm., Cincinnati, O.
Powers Regulator Co., Chicago, Ill.
Russell & Co., W. A. New York.
Trane Co., La Crosse, Wis.
Scott Valve Mfg. Co., Detroit, Mich.
Simplex Heating Specialty Co., Inc., Lynchburg, Pa.
Sterling Engineering Co., Milwaukee, Wis.
Stickle Steam Specialties Co., Indianapolis, Ind.
Webster & Co., Warren, Camden, N. J.

Reducing.

American District Steam Co., No. Tonawanda, N. Y.
Atlas Valve Co., Newark, N. J.
Davis Regulator Co., G. M., Chicago, Ill.
Dunham Co., C. A., Chicago, Ill.
Illinois Engineering Co., Chicago, Ill.
Jenkins Bros., New York.
Johnson Service Co., Milwaukee, Wis.
Kieley & Mueller, Inc., New York.
Lytton Manufacturing Co., Franklin, Va.
McAlear Mfg. Co., Chicago, Ill.
Mason Regulator Co., Boston, Mass.
Powell Co., Wm., Cincinnati, O.
Powers Regulator Co., Chicago, Ill.

Regulating.

American District Steam Co., No. Tonawanda, N. Y.
Atlas Valve Co., Newark, N. J.
Fulton Co., Knoxville, Tenn.
Hornung, J. C., Chicago, Ill.
Illinois Engineering Co., Chicago, Ill.
Jenkins Bros., New York.
Kieley & Mueller, Inc., New York.
Klipfel Mfg. Co., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
Powell Co., Wm., Cincinnati, Ohio.
Powers Regulator Co., Chicago, Ill.

Relief (Water).

American Schaeffer & Budenberg Corp., Brooklyn, N. Y.
Klipfel Mfg. Co., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
Powell Co., Wm., Cincinnati, O.

Safety.

American District Steam Co., No. Tonawanda, N. Y.
American Schaeffer & Budenberg Corp., Brooklyn, N. Y.
Jenkins Bros., New York.
Powell Co., Wm., Cincinnati, O.

Stop and Check.
(See Valves, Non Return).

VENTILATING HEATERS

Portable Unit.

American Blower Co., Detroit, Mich.
Buckeye Blower Co., Columbus, Ohio.
Ilg Electric Ventilating Co., Chicago, Ill.
Mueller Furnace Co., L. J., Milwaukee, Wis.
Nelson Corporation, Herman, Moline, Ill.
Nesbitt, John J., Inc., Atlantic City, N. J.
Pecco, Inc., St. Louis, Mo.
Peerless Unit Ventilation Co., Inc., Long Island City, N. Y.
Stickle Steam Specialties Co., Indianapolis, Ind.
Sturtevant Co., B. F., Hyde Park, Mass.
York Heating & Ventilating Co., Philadelphia, Pa
(See also Heaters, Portable Unit Air).

VENTILATING SYSTEMS

Air Conditioning & Engineering Co., St. Louis, Mo.
American Blower Co., Detroit, Mich.
Autovent Fan & Blower Co., Chicago, Ill.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Buckeye Blower Co., Columbus, O.
Buffalo Forge Co., Buffalo, N. Y.
Carrier Engineering Corporation, Newark, N. J
Clarage Fan Co., Kalamazoo, Mich.
Ilg Electric Ventilating Co., Chicago, Ill.
Nelson Corporation, Herman, Moline, Ill.
Nesbitt, John J., Inc., Atlantic City, N. J.
New York Blower Co., Chicago, Ill.
Pecco, Inc., St. Louis, Mo.
Peerless Unit Ventilation Co., Inc., Long Island City, N. Y.
Seymour, James M., Newark, N. J.
Skinner Bros. Mfg. Co., St. Louis Mo.
Sturtevant Co., B. F., Hyde Park, Mass.
L. J. Wing Mfg Co., New York.
York Heating & Ventilating Co., Philadelphia, Pa

VENTILATORS.

Aeolus Dickinson Co., Chicago, Ill.
Buckeye Blower Co., Columbus, O.
Buffalo Forge Co., Buffalo, N. Y.
Ilg Electric Ventilating Co., Chicago, Ill.
New York Blower Co., Chicago, Ill.
Pecco, Inc., St. Louis, Mo.
Peerless Unit Ventilation Co., Inc., Long Island City, N. Y.
Seymour, James M., Newark, N. J.
Sturtevant Co., B. F., Hyde Park, Mass.
L. J. Wing Mfg. Co., New York.
York Heating & Ventilating Co., Philadelphia, Pa

Mushroom.

Aeolus Dickinson Co., Chicago, Ill.
Knowles Mushroom Ventilator Co., New York
New York Blower Co., Chicago, Ill.
Sturtevant Co., B. F., Hyde Park, Mass.
Ventilating Products Co., Chicago, Ill.

WATER STERILIZERS

Air Conditioning & Engineering Co., St. Louis, Mo.

WEATHER STRIPS.

Metal.

Athey Company, Chicago, Ill.
Chamberlin Metal Weather Strip Co., Detroit, Mich.
Higgin Manufacturing Co., Newport, Ky.

WELDERS.

Electric Arc.

Lincoln Electric Co., Cleveland, Ohio.

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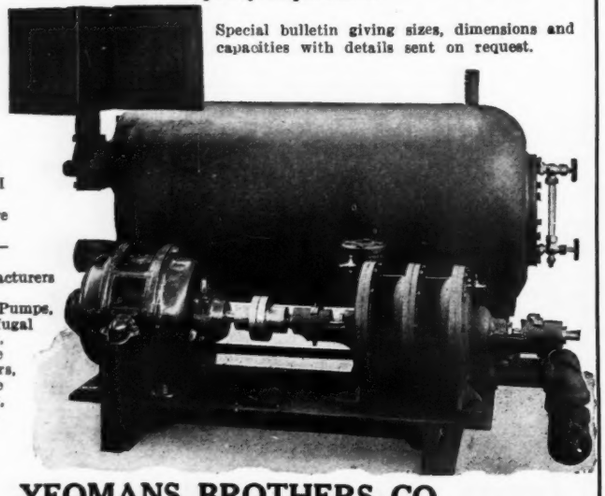

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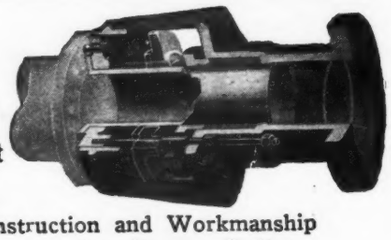

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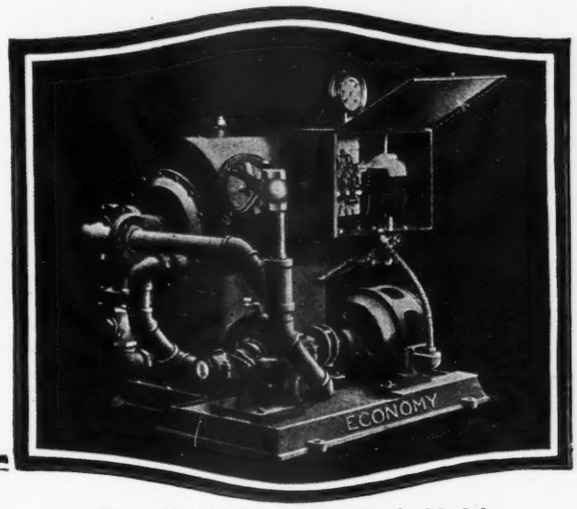

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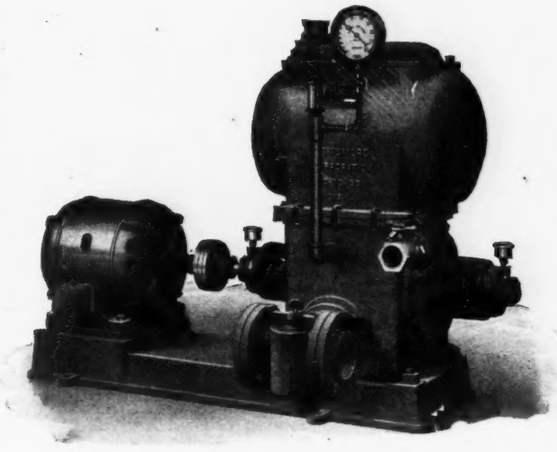

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